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Amphibian and Reptile Distribution and Habitat Relationships in the Lost River Mountains and Challis-Lemhi Resource Areas

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ge Cos-Share Agreement with Salmon-Challis National Forest, Lost River and Challis Ranger Districts, and Bureau of Land Management, Salmon Office

Summary

Prior to 1996, information on amphibian and reptile populations inhabiting the Salmon-Challis National Forest (USFS) lands of the Lost River Mountains and the Bureau of Land Management (BLM) lands of the Challis and Lemhi Resource Areas consisted of a few museum records and poorly documented incidental observations. Through a challenge cost-share agreement with the USFS Salmon-Challis National Forest and the BLM Salmon Office, we compiled historic records, interviewed local residents, and systematically surveyed wetland habitats within this rugged 9,000 km^2 area for amphibians and reptiles. Field surveys began in May, 1996, and continued through September, 1997. We compiled physical, chemical, and habitat data at 70 wetland sites, and revisited some sites, such as portions of Chilly Slough, up to a half dozen times within the same year, and in both years. Additionally, more than 50 areas were searched opportunistically both for amphibians and reptiles.

Four amphibian species and 9 reptile species were encountered during the study. Columbia Spotted Frogs (*Rana luteiventris*) and Western Terrestrial Garter Snakes (*Thamnophis elegans*) were the most common species encountered. Other amphibians detected within the study area were: Long-toed salamanders (*Ambystoma macrodactylum*), Western Toads (*Bufo boreas*), and Pacific Treefrogs (*Pseudacris (=Hyla) regilla*). Tailed Frogs (*Ascaphus truei*), although known to occur in mountain streams near the study area, were not detected. Besides Western Terrestrial Garter Snakes, we encountered the following reptiles: Painted Turtles (*Chrysemys picta*), Short-horned Lizards (*Phrynosoma douglassi*), Sagebrush Lizards (*Scleoporus graciosus*), Rubber Boas (*Charina bottae*), Racers (*Coluber constrictor*), Gopher Snakes (*Pituophis catenifer*), Common Garter Snakes (*T. sirtalis*), and Western Rattlesnakes (*Crotalus viridis*). We didn't detect any amphibians and only Western Terrestrial Garter Snakes in the Lost River Mountains. Painted Turtles, which we didn't expect to encounter, were found in a pond north of Carmen and were reported by local residents to have occurred in ponds and sloughs along the Salmon River north of Salmon for at least the last 40 years.

We taught a short course for teachers covering amphibian and reptile identification, field survey techniques, and data recording in Challis during summer 1997. We will be offering a similar course for teachers in Salmon during summer 1998.

Copies of the Geographic Information System (GIS) database of our findings, including digital topographic maps (1:100,000) of survey site and observation locations, digital photographs of survey sites, and data spreadsheets, will be provided to the USFS Salmon-Challis National Forest and the BLM Salmon Office.

Introduction

During the past decade, herpetologists and others have become concerned about perceived declines of amphibian populations worldwide. In western North America, reported species declines largely concern pond-breeding frogs and toads, particularly of the genera *Rana* and *Bufo*. Assessment of these apparent declines has been hampered by lack of baseline data and lack of long-term monitoring of amphibian distributions and population dynamics.

Until recently, east central Idaho was, herpetologically, one of the least known areas in the northern Intermountain West. C. Hart Merriam, Vernon Bailey and others of the U.S. Biological Survey collected amphibians and reptiles in Butte and Custer counties in 1890 and 1895; and a party led by C. H. Gilbert in 1894 collected reptiles in Butte county around Arco. Since then, information on amphibians and reptiles in the area has been collected sporadically and opportunistically by interested individuals and natural resource agency personnel. Recently, the scarcity of information about amphibians and reptiles of the area, and increased awareness of regional amphibian population declines by natural resource agencies, prompted herpetological surveys in east central Idaho by the USFS on the Salmon National Forest (O'Siggins 1995) and Yankee Fork Ranger District (Churchwell 1996). Two research projects concerning amphibians in high mountain lakes, in the Sawtooth Mountains (Munger et al. 1997) and in the Bighorn Crags (Pilliod et al. 1997, Pilliod and Peterson 1997), were recently initiated. However, the extensive landscape of BLM lands of the Challis and Lemhi Resource Areas, and the isolated Lost River Range, managed by USFS Challis and Lost River Ranger Districts, had not been surveyed for amphibians and reptiles prior to 1996. This area is of interest in part because several sensitive species of amphibians are known to occupy or potentially occupy the area, and range limits of several amphibian and reptile species occur here.

In spring 1996, the Salmon-Challis National Forest (Challis and Lost River Ranger Districts), the BLM (Salmon Office), and the Herpetology Laboratory at Idaho State University (ISU) combined resources and initiated a two-year survey of these lands for amphibians and reptiles. Specifically, survey objectives were:

- Summarize known information on amphibian and reptile distributions for the study area. Sources of information include: the Idaho Museum of Natural History Northern Intermountain Herpetological Database (NIHD), BLM and USFS observation records, and study area residents.
- Conduct field surveys during 1996 and 1997 using standard protocols (e.g., timed searches, dip nets, automated recordings, road driving, trapping).
- Develop a GIS database and maps of amphibian and reptile distributions, and associated habitat data.

- Provide recommendations for monitoring amphibians and reptiles.

Study Area

Our survey area encompassed the BLM Salmon District Office's Challis and Lemhi Resource Areas (RA), and the Salmon-Challis National Forest's lands in the Lost River Mountains (Challis and Lost River Ranger Districts [RD]) (Fig. 1). The area is approximately 9,000 km^2, almost double the size of Delaware. Although we surveyed only public lands, we also obtained some locations of amphibians and reptiles on private lands from local residents.

The Lost River Mountains are an isolated, narrow range, running northwest to southeast, surrounded by broad valleys of Great Basin sagebrush steppe. The range contains the highest peaks in Idaho (Mt. Borah at 3,859 m [12,662 ft]), rugged topography, both forested and rangeland vegetation, and many lakes and streams. The surrounding BLM lands of the Challis RA, as well as the Lemhi RA to the east, are comprised principally of Great Basin rangeland vegetation (e.g., bunchgrasses, sagebrush, greasewood, mountain mahogany) at lower elevations with gentler topography, although steep canyons and rocky cliffs are common. Two large marsh complexes on BLM lands (Chilly Slough on the Challis RA and Birch Creek on the Lemhi RA) are managed as conservation areas.

Methods

We searched museum and observation records contained in the NIHD for amphibian and reptile species collected or reported from Butte, Custer, and Lemhi counties within and adjacent to the study area. Records for the area spanned a century. We also referred to Nussbaum et al. (1983) for county records of species occurrence. From this search, we compiled a list of amphibian and reptile species either known to occupy the study area or that potentially could occupy the area based on species geographic ranges.

We contacted local residents and natural resource agency personnel (BLM, USFS, Idaho Department of Fish and Game [IDFG]) to obtain additional species occurrence and distributions. We taught a 4-day short course for public school teachers emphasizing amphibian and reptile identification, data recording protocols, and field survey techniques. These efforts added significantly to the number of documented species locations.

We focused our survey efforts on amphibians for several reasons: (1) aquatic habitats upon which amphibians depend are threatened throughout the dry Intermountain West by development, pollution, and irrigation diversions, (2) amphibians, because of their life history characteristics spanning both aquatic and terrestrial habitats, and as both herbivores and predators, can serve as important bioindicators of habitat degradation, and (3) amphibians are more easily and predictably detected than reptiles. Potential amphibian sites for the study area were identified by agency biologists either from records of reported amphibians or based on habitat. Because the study area was so large, we did not attempt to survey all possible sites, rather we selected a variety of wetland habitats (e.g., lakes, ponds, streams, springs, bogs) over a broad geographic and elevational range within the study area. Specific site selection resulted from agency management priorities (e.g., Chilly Slough and Birch Creek Conservation Areas [CA], Spring Hill, Trail Creek Area of Critical Environmental Concern [ACEC]) and ease of access. Reptiles observed incidental to amphibian survey efforts were recorded. We began the study in mid-May, 1996, and continued through September, 1997.

At each amphibian survey site, we used a standardized protocol based on a U.S. Fish and Wildlife Service "Amphibian Survey Data Sheet" developed by Paul Stephen Corn (Fig. 2). Data were recorded on locality (e.g., county, site location, Universal Transverse Mercator [UTM] coordinates, elevation), species detected (e.g., identification, abundance, life stage), physical and chemical attributes of the site (e.g., weather, pH, conductivity, water temperature), and habitat characteristics (e.g., vegetation, pond size, water depth, distance to forest) (see Table 1 for detailed methods). We used a temperature-compensated Oakton pHTestr 2 pH meter, a temperature-compensated Oakton TDSTestr3 conductivity meter (μS/cm), and a Miller & Weber cloacal thermometer to measure air and water temperature (C). We surveyed using timed visual searches in combination with dip netting. At a few sites we used an automated call recording system where we anticipated that Pacific Treefrogs or Boreal Chorus Frogs (*Pseudacris triseriata*) might be present.

During April and May of 1997, we established a grid of funnel traps in the vicinity of a reported snake den along Birch Creek in the Challis RA, a few miles southwest of Challis. The trapping grid consisted of 15 funnel traps, some with 1 m long drift fences on either side of the entrance to the trap. Traps were made of hardware cloth similar in design to a minnow trap. We monitored traps every day for 6 weeks.

Results and Discussion

Occurrence

Prior to our survey, museum records and recorded observations confirmed 5 of 9 potential species of amphibians inhabiting the study area or areas immediately adjacent (Table 2). Eight of 12 potential reptile species also were reported for the area. Local

residents reported Painted Turtles, for which there were no records of occurrence in central Idaho, in areas along the Salmon River north of Salmon. A complete summary of museum records, historic and current observations, and survey records of species occurrence for the study area are presented in Appendix I.

We surveyed 70 sites with many sites revisited during the same year and over both years during the two years of surveys (Fig. 3, Appendix II-V). We also opportunistically searched > 50 aquatic and terrestrial habitats in addition to the surveyed sites. We encountered 4 of the 5 confirmed amphibian species during surveys and opportunistic searches. Nine reptile species were encountered during surveys and searches.

We found no record of amphibians in the Lost River Mountains. Bart Gamett, Lost River RD, who conducted surveys of lakes as well as water sources for bighorn sheep throughout the Lost River Range didn't report encountering any amphibians (Gamett 1990). Likewise, we didn't find any amphibians in the Lost River Range although we searched numerous streams and lakes throughout the range. Most accessible lakes and major creeks have fish, many stocked by IDFG over the past 30-50 years (IDFG records, Salmon). However, we surveyed a number of suitable looking ponds and small lakes without fish but didn't detect amphibians. For example, Spring Hill on the east side of the Lost River Range contains more than a half dozen ponds, many supporting lush emergent vegetation, and none with fish detected. We surveyed these ponds in June 1996 and July 1997, encountering a few Western Terrestrial Garter Snakes but no amphibians. There were cattle grazing around these ponds but only a few ponds evidenced excessive trampling, and removal of riparian and emergent vegetation. There are observations of Columbia Spotted Frogs on both sides of the Lost River Range on private and public lands (Fig. 9). Tailed Frogs may inhabit the range but searches in several drainages failed to detect them.

We can only speculate about the apparent absence of amphibians in the Lost River Mountains. Many of the lakes and streams in the range have been stocked with fish for sport fishing by IDFG. Many of the creeks originating in the range are diverted for irrigation at the base of the mountain range. And the range is surrounded mostly by dry sagebrush desert. We don't know whether amphibian populations ever inhabited the Lost River Range or became extinct with many obstacles to recolonization.

Distribution

Columbia Spotted Frogs and Western Terrestrial Garter Snakes were the most widespread amphibian and reptile species, respectively, in the study area (Table 2). Both species distributions encompassed the geographic extent of the study area with the exception that spotted frogs were not detected in the Lost River Range. Western rattlesnakes also were widespread although not commonly seen.

Amphibian populations, generally, are sparsely dispersed and uncommon throughout the study area, particularly in the Challis RA. The Challis RA contains some of the most xeric landscapes in Idaho so wetland habitat is scarce. Therefore, amphibian populations may be isolated from each other. Extensive disturbance of a breeding site may cause the extinction of a local amphibian population with little likelihood of recolonization from other distant populations e.g., a population of spotted frogs in the Bear Creek drainage of Road Creek is unlikely to interact with a population of spotted frogs in Chilly Slough, many kilometers distant with little suitable habitat in between. The marshes and sloughs on private lands in Round Valley around Challis, and the lower reaches of the Pahsimeroi River have been drained or modified for agriculture during the past century. Still small populations of spotted frogs exist in these areas.

The Lemhi RA contains more mesic habitat with amphibian populations (apparently at least Columbia Spotted Frogs and Pacific Treefrogs) more evenly dispersed and presumably less isolated than in the Challis RA. Therefore, localized disturbance of amphibian habitat may have less severe long-term consequences to amphibian populations than in the Challis RA.

Relative Abundance

We found Long-toed Salamanders at 3 survey sites, Western Toads at 1 survey site, Pacific Treefrogs at 2 survey sites, and Columbia Spotted Frogs at 14 survey sites. Western Terrestrial Garter Snakes were the only reptile species found during surveys (7 sites).

Except for larvae of Long-toed Salamanders and tadpoles of Columbia Spotted Frogs, we encountered few individuals of any species at surveyed sites or elsewhere. Twelve adult Columbia Spotted Frogs at a pond in the Cow Creek drainage (Lemhi RA, Site No. 62) was the largest number of any species (excepting larvae and tadpoles) detected at any surveyed sites. Dozens of Western Toad metamorphs were observed near Horse Basin Spring No. 1 (Challis Ra, Site No. 49) in early June, 1996 by BLM personnel (Appendix I). Generally, museum records, observations, and surveys document only one to a few individuals of any amphibian or reptiles species in the study area.

Habitat

Surveyed sites ranged from high-elevation cirque lakes (e.g., Merriam Lake in the Lost River Mountains, Fig. 4a), to permanent ponds surrounded by willows and sedges (e.g., a Spring Hill pond on the east side of the Lost River Mountains, Fig. 4b), to seasonal ponds with emergent sedges (e.g., a pond near the abandoned South Butte Mine west of Clayton, Fig. 4c), to large marshes with dense cattails and sedges (e.g., Chilly Slough CA north of Mackay, Fig. 4d).

Elevation of surveyed sites ranged from 1,146 m (3,760 ft) at the Tower Creek sloughs at the northern end of the study area, to 2,926 m (9,600 ft) at Merriam Lake in the Lost River Range (Table 3). All pH readings were neutral to basic, ranging from 7.2 in a pond in the Cow Creek drainage near the Ramsey Mountain Road turnoff, to 9.7 in a pond at Spring Hill. Columbia Spotted Frogs were found almost across the entire pH range encountered, 7.2 to 9.3. Conductivity was lowest (1 uS/cm) in the upper reaches of Trail Creek, in the Lemhi RA's Trail Creek ACEC, and highest in the Tower Creek sloughs (280 uS/cm). Water temperatures were lowest in Trail Creek (4 C), and highest in ephemeral ponds near the mouth of Hot Springs Creek (29 C) where Pacific Treefrog tadpoles were found.

Long-toed Salamander (*Ambystoma macrodactylum*)

Museum records document Long-toed Salamanders collected only from areas outside the study area, in the Sawtooth Mountains in Custer County, and at Corn Lake north of the confluence of the Middle Fork and Main Salmon Rivers in Lemhi County (NIHD). Nussbaum et al. (1983) show a single record from northwestern Lemhi county (probably the Corn Lake observation). P.J. Smith (USFS, Challis RD, pers. commun.) reported Long-toed Salamander larvae within the study area in a small pond along Highway 93 about 2-3 km south of Poison Creek. Additionally, he has encountered both larvae and adults in a pond along the Big Hill Road west of Challis, just outside the western border of the study area. BLM seasonal personnel reported Long-toed Salamander larvae near Basin Creek and Trail Creek ACEC in Lemhi county in 1995. And local teacher and rancher, Judy Madsen, reported Long-toed Salamanders along the Salmon River north of Challis (Appendix Ia).

Found in a wide range of habitats throughout northern and central Idaho (Nussbaum et al. 1983), we encountered Long-toed Salamanders (larvae only) at 3 surveyed sites: one a permanent pond adjacent to Eighteenmile Creek which drains into the Lemhi River, the other two sites were ephemeral ponds near the abandoned South Butte Mine near Clayton (Fig. 5, Appendix II-V). Salamander larvae co-occurred with adult Columbia Spotted Frogs at the Eighteenmile Creek pond and occurred alone at the two South Butte Mine ponds. All ponds were fishless nor did we detect other amphibian predators such as Western Terrestrial Garter Snakes. Interestingly, we did not find salamanders or other amphibians at a permanent fishless pond near the occupied ponds at South Butte Mine.

Tailed Frog (*Ascaphus truei*)

Tailed Frogs are tied to swift mountain streams, usually with a forest overstory. Nussbaum et al. (1983) report 2 records of Tailed Frogs in Lemhi county but we are not aware of any confirmed occurrence of Tailed Frogs in the study area. Tailed Frogs were

encountered in Bayhorse Creek below Bayhorse Lake on the Yankee Fork RD (Churchwell 1996), several kilometers from the study area boundary (Fig. 6). P.J. Smith reported an adult male killed on the road along Freeman Creek, northeast of Salmon (Appendix I). Other undocumented reports exist. There is a report of Tailed Frogs in Lemhi RA's Trail Creek ACEC but we were unable to find who reported it or any documentation. Nor did we find Tailed Frogs there in September, 1997 (Appendix IV). We searched streams in the Lost River Mountains, and drainages of the Pahsimeroi and Lemhi Rivers yet didn't detect Tailed Frogs. Tailed Frogs are common in streams in the Middle Fork Salmon River drainage west of the study area (Duncan et al. unpublished data), and have been found in the upper drainages of the Salmon River near Stanley (Churchwell 1996). Adults feed at night and hide under rocks or other stream debris during the day; tadpoles usually are attached on the underside of rocks in swift streams, so these frogs are difficult to detect. Therefore, despite the lack of observation records, Tailed Frogs may occur within the study area.

Western Toad (*Bufo boreas*)

The oldest record we obtained was a toad collected in 1895 in the Sawtooth's from "White's Warm Springs." Within the study area, a toad was collected from Peterson Creek between Lemhi and Leadore in 1944 (Fig. 7, Appendix I). Nussbaum et al. (1983) report Western Toads in Custer and Lemhi counties but not Butte county. P.J. Smith (USFS, Challis RD, pers. commun.), who grew up in Salmon, reported that prior to 1965, toads were common in Salmon. He remembers seeing as many toads as he did spotted frogs. Helen Ulmschneider (BLM, Lemhi RA, pers. commun.) reported adult Western Toads found in a spring box for several years at Raindrop Springs (Appendix I).

In the Challis RA, Western Toad observations mostly come from an area centered in the Road Creek drainage (i.e., Horse Basin, Corral Creek, Bear Creek, Sage Creek) (Fig. 7). We found toads only at one survey site, a pond in the Bear Creek drainage (Appendix IV). These were metamorphs found with Columbia Spotted Frogs and Western Terrestrial Garter Snakes. No fish were present although Jerry Gregson (BLM, Challis RA, pers. commun.) reported that efforts were made to stock this pond with fish in the 1950s or 1960s.

Western Toads use a variety of habitats, from wetlands to sagebrush to forest. Immature toads emerging from their natal ponds may appear like swarms of grasshoppers then disappear completely within a few days, hiding under ground in small mammal burrows, crevices, etc.

Pacific Treefrog (*Pseudacris [=Hyla] regilla*)

Treefrogs during non-breeding periods are terrestrial with enlarged toe pads adapted for climbing into low shrubs. During the breeding period they are associated

with still water -- ponds, marshes, lakes, and irrigation ditches. These frogs are commonly heard calling around Salmon during spring and early summer, and sometimes in the fall. Surprisingly, we found no documented reports of their presence in the study area. P.J. Smith observed these frogs during the 1970s and 1980s around Salmon but noted that they were not common. Yet during Fall, 1997, Pacific Treefrogs were found commonly outside and inside the BLM office in Salmon (Loren Anderson, Lemhi RA, pers. commun.).

We recorded Pacific Treefrogs calling east of the Salmon Airport in the sedge and tule marsh bordering Hot Springs Creek, and found tadpoles in ephemeral ponds on the greasewood flats a few hundred meters west (Fig. 8, Appendix IV). We also found tadpoles at Morgan Bar Recreation Area north of Salmon. Calling frogs are reported from the valley surrounding Salmon and up the Lemhi River valley beyond Tendoy. Teachers from Mackay also reported to us that there are frogs calling near Mackay but we haven't determined that these are treefrogs. Also, a student at Challis Middle School reported finding a "tree frog" in Challis. The indication is that tree frogs have increased in abundance in recent years, possibly associated with larger areas of irrigation. O'Siggins (1995) reported Pacific Treefrogs [illegible] ponds on the Salmon National Forest, north and west of our study area.

Columbia Spotted Frog (*Rana luteiventris [=pretiosa]*)

(Note: Spotted frogs have recently been split into 2 species, the Columbia Spotted Frog [*R. luteiventris*] and the Oregon spotted frog [*R. pretiosa*] [Green et al. 1997]. Our species is *R. luteiventris*). These frogs typically are associated with marshy ponds, lakes, slow-moving streams, and stream overflow areas. Historic records and our surveys (detected at 14 survey sites and numerous incidental observations) found spotted frogs to be the most common amphibian within the study area. We did not find them in the Lost River Range and there are large expanses where they apparently don't occur (Fig. 9).

Studies of lakes in the Bighorn Crags and in the Sawtooth Mountains show that spotted frog populations don't reproduce well when fish are present (Munger et al. 1997, Pilliod and Peterson 1997). We did find tadpoles and adult frogs in Chilly Slough CA and Birch Creek CA where fish are abundant. Tadpoles were in overflow pools or very dense algae mats, which apparently provide sufficient protection from fish predation. We also found adult frogs with fish in a pond on Hyde Creek. These frogs were in protected shallows except one that swam to deeper water on our approach. This frog was quickly eaten by a fish.

Whiskey Springs, a part of the Chilly Slough CA, may contain an important hibernaculum for spotted frogs. Jerry Gregson (BLM, Challis RA, pers. commun.) reported dozens of frogs gathered around boiling sand springs there in mid-October, 1996 (Appendix I).

Painted Turtle (*Chrysemys picta*)

We were surprised to receive reports of turtles and turtle shells in the study area. There are no documented records of turtles in east central Idaho. There are Painted Turtle populations in northern Idaho with introduced populations along the eastern and western borders of southern portions of the state (IDFG 1994), a considerable distance from our study area.

Local reports indicate that turtles have been observed near Carmen for as long as 40 years. These reports all indicate localization in ponds and sloughs along the Salmon River near Carmen. We did encounter several Painted Turtles in a single pond north of Carmen (Fig. 10, Appendix IV). The turtles were distinctly different in size, indicating different age classes. Apparently this species was introduced as much as a half century ago and is now naturalized north of Salmon. We don't know of any other reports of turtles from other areas within our survey area or in east central Idaho.

Short-horned Lizard (*Phrynosoma douglassi*)

Short-horned Lizards are found principally in sagebrush desert in sandy or loose soils associated with ants, their major food. Nussbaum et al. (1983) report Short-horned Lizards from Custer and Lemhi counties. Museum records for the study area all come from the upper Pahsimeroi valley (Fig. 11, Appendix I). There also are numerous records in the Arco area (NIHD). Short-horned Lizards can be found at high elevations (Nussbaum et al. 1983); one was found in the Eighteenmile Creek drainage at 2800 m elevation (P.J. Smith, pers. commun.) We found an adult near the Sheep Creek drainage on the north side of Willow Creek Summit, which is an area BLM personnel had reported seeing them in the past. Helen Ulmschneider (BLM, Lemhi RA) encountered several Short-horned Lizards in the Birch Creek Valley near Mud Creek and one just west of Leadore. There are other undocumented reports of Short-horned Lizards scattered throughout the study area. The species appears to be widespread but seldom encountered.

Sagebrush Lizard (*Sceloporus graciosus*)

This species has a similar range as the Short-horned Lizard in Idaho, occupying similar sagebrush habitat although they also can be found in dry, open, low-elevation woodland. Nussbaum el al. (1983) show them inhabiting both Custer and Lemhi counties. Museum records show this species occurring from south of Challis to north of Salmon in the study area. School children in Challis report that Sagebrush Lizards or "blue-bellies" commonly are caught near town. We encountered this species at several locations in greasewood and sagebrush habitat (Fig. 12, Appendix I).

Rubber Boa (*Charina bottae*)

Rubber Boas generally are nocturnal and so less readily encountered compared to diurnal snakes such as Racers and Gopher Snakes. They occupy a wide range of habitats throughout Idaho from sagebrush desert to montane forest. Nussbaum et al. (1983) show no records of Rubber Boas in Butte, Custer, or Lemhi counties. Our museum records indicate an observation of a Rubber Boa in 1966 a few miles southwest of Clayton (NIHD). Prior to 1996, BLM personnel reported observations of Rubber Boas both in Lemhi and Custer counties (Fig. 13, Appendix I). We encountered a Rubber Boa near the buffalo jump turnout along Highway 75, a couple miles south of Challis. P. J. Smith reported finding Rubber Boas north of Salmon on Diamond Creek and 4th of July Creek, and at the junction of Mill Creek and Challis Creek roads north of Challis. Roy Churchwell (pers. commun.) reported Rubber Boas on Herd Creek and Morgan Creek. Other local residents reported Rubber Boas in the study area or nearby.

Racer (*Coluber constrictor*)

Racers inhabit areas of open vegetation – grassland, sagebrush desert, meadows, and open woodland, and are generally absent from forests and high mountains (Nussbaum et al. 1983). They are the only snake species in Idaho whose young have different color patterns from adults (juveniles are blotched anteriorly while adults are uniformly brown or olive above). Nussbaum el al. (1983) do not show Racers as occurring in Custer or Lemhi counties, nor are there museum records showing its occurrence in these counties. Racers have been recorded in southeastern Butte county and near Big Southern Butte (NIHD). There is one observation from BLM personnel in 1993 of a Racer in Lemhi county near Cow Creek (Appendix I). We received an observation of a Racer also in the Cow Creek drainage from a local resident. We encountered three Racers, one a juvenile, in the Challis RA in Spring Gulch north of Challis (Fig. 14, Appendix I).

Gopher Snake (*Pituophis catenifer*)

Gopher Snakes are found in a variety of habitats from desert to coniferous forest, although usually not at high elevations or within dense forest (Nussbaum et al. 1983). They've been reported from the northwestern border of Lemhi county, in Butte county near Arco and Moore, but not in Custer county (Nussbaum et al. 1983, NIHD). We encountered an adult at the northern end of Grandview Canyon in the Challis RA in June, 1997. We've also received reports of Gopher Snakes observed near Ellis (Fig. 15, Appendix I).

Western Terrestrial Garter Snake (*Thamnophis elegans*)

Western Terrestrial Garter Snakes, which inhabit a wide variety of habitats throughout Idaho (generally near water), are the most common snake species in Idaho, and the most common and widespread snake species encountered in the study area. Nussbaum et al. (1983) present sightings for Butte and Custer counties but not Lemhi county. We commonly encountered these garter snakes near wetland habitat in both Custer and Lemhi counties (Fig. 16), many times associated with spotted frogs. Western Terrestrial Garter Snakes were the only amphibian or reptile that we encountered in the Lost River Range.

Common Garter Snake (*Thamnophis sirtalis*)

The Common Garter Snake, although the most common species of garter snake in North America, is not common within the study area with only one observation reported by Nussbaum et al. (1983) in Lemhi county. Museum records show a Common Garter Snake collected just south of Carmen, in Lemhi county (NIHD, Fig. 17). P. J. Smith reported encountering "20-30" Common Garter Snakes in Lemhi county over the years, particularly in the Kirtly Creek and Freeman Creek drainages. He has not found any in Custer county. We encountered one Common Garter Snake at the Morgan Bar Recreation Area north of Salmon in June, 1997 (Fig. 17). We also observed a garter snake swimming in Summit Creek in the Little Lost River Valley that might have been a Common Garter Snake but we were unable to identify the species.

Western Rattlesnake (*Crotalus viridis*)

Western Rattlesnakes are widespread in Idaho although Nussbaum et al. (1983) do not report them from Custer county, nor did we find museum records of their occurrence in Custer county. Despite the lack of records, rattlesnakes are widespread although not commonly encountered within the study area (Fig. 18).

Based on our discussions with local residents and evidence at reported den sites within the study area, rattlesnake dens have experienced persistent persecution over many decades. Several residents reported destroying snake dens – using dynamite to destroy den openings, igniting fuels poured into den openings, burying dens with bulldozers. Many residents consider killing rattlesnakes a civic duty – each spring and fall killing dozens of snakes as they gather at traditional den sites. Several species of snakes (e.g., Western Rattlesnakes, Gopher Snakes, Racers, Western Terrestrial Garter Snakes) may den communally. Therefore efforts to eradicate rattlesnakes also may kill other species of snakes.

We attempted live trapping at a reported den site in Birch Creek, a few miles southwest of Challis during April and May of 1997. We were unsuccessful although we encountered a Western Terrestrial Garter Snake shedding its skin at this site.

Management Recommendations

1. ***Continue gathering and reporting data on amphibian and reptile observations.***

Although our knowledge of the herpetofauna of east central Idaho has been significantly increased by the current study, it is still incomplete. The careful recording and reporting of observations by agency personnel and local residents can be one of the most important sources of information concerning the local distribution of amphibians and reptiles. It is often possible to easily integrate reporting herpetological observations into current activities (e.g., fishery surveys). Actions that will encourage the reporting of observations include: (1) training on how to identify amphibians and reptiles; (2) the provision of data forms and reference materials; and (3) a local contact person responsible for collecting reported observations and forwarding them to the Northern Intermountain Herpetological Database at the Idaho Museum of Natural History. The Herpetology Laboratory at Idaho State University can provide assistance with these activities in a variety of ways. Information on identification, data forms, distribution, conservation issues, snake bite, surveying and monitoring procedures, current research projects, courses and workshops, etc. will be available on the ISU Herpetology Laboratory Web Site (http://www.isu.edu/~petechar/herplab/hlmenu.htm). The Herpetology Laboratory also can provide training and can answer questions on the ecology and conservation of amphibians and reptiles.

2. ***Conduct further surveys.***

Further surveys of streams for Tailed Frogs and continued searches for snake overwintering sites would be important extensions of the current study. Surveys of caves for subfossil amphibians and reptiles might provide useful information on what amphibians and reptiles occurred in the study area in prehistoric times. This might be particularly meaningful in the Lost River Mountains to evaluate the question of whether amphibians ever occurred there.

3. ***Monitor selected sites at a 5 to 10 year interval.***

Regular monitoring of the occurrence of various life stages of amphibians and reptiles at a subset of current sampling sites would provide information crucial to long-term management of amphibians and reptiles. Because relatively few (i.e., 22) of the current sites were occupied, all of these sites would be used for monitoring, including the Chilly Slough and Birch Creek Conservation Areas. If overwintering areas for snakes are discovered in the future, these sites should be incorporated into the monitoring program. It also is necessary to include sampling sites where amphibians and reptiles were not found to allow for the possibility of population increases or changes in site occupation. Selection criteria for these sites would include stratification by management area, cover type, and elevation. Specific recommendations for monitoring sites are included in Table 4. We recommend that monitoring be conducted at 5-year intervals, if possible, but at no longer than 10 year intervals. The actual fieldwork, data management, analysis, and report writing could be performed by agency and/or Herpetology Laboratory personnel. Ideally, a monitoring program for east central Idaho would be integrated

into a state-wide monitoring program for amphibians and reptiles. Well-documented data, archived in accessible GIS databases, are essential to building a foundation for understanding of the consequences of land management actions on amphibian and reptile populations.

4. ***Avoid stocking any currently fishless wetlands with fish.***

Research in Idaho and elsewhere indicates that introduced fish can eliminate or significantly reduce amphibian populations (Koch et al. 1997, Munger et al. 1997, Pilliod and Peterson 1997). Most of the lakes in the Lost River Range have been stocked. Brook trout and possibly other fish have been stocked in Chilly Slough, Birch Creek, Summit Creek, and other wetlands and streams in the Challis RA and Lemhi RA. There are reports of tropical fish having been dumped into Barney Hot Springs near Summit Creek (where spotted frogs have been reported in the past), or escaping from a commercial fish farm south of Challis and breeding in irrigation ditches in the Challis RA. Because of the probable negative effects of the introduction of fish on native amphibians, we recommend that agencies take actions to prevent currently fishless waters from being stocked with fish.

5. ***Protect any isolated wetlands with amphibians.***

Because there apparently are so few sites in the study area inhabited by amphibians, we recommend that agencies try to protect [illegible] those sites. Livestock grazing on public lands can have variable effects on amphibians. The creation of stock ponds and light grazing around densely vegetated wetland can increase opportunities for amphibian reproduction. Conversely, livestock overgrazing and trampling can destroy wetland potential for amphibian use, lower water tables, and dry up wetlands. Diversion of springs and streams for water troughs and irrigation also can eliminate habitat (e.g., hibernacula at springs). Although current management policies focusing on proper use of riparian habitat may achieve adequate protection of fish habitat, we recommend that allotment plans also consider strategies to protect amphibian habitat. Ephemeral ponds such as those near the abandoned South Butte mines which harbored hundreds of Long-toed Salamander larvae, permanent breeding ponds evidencing diverse and abundant amphibian populations (such as the pond in Bear Creek on the Challis RA and the pond near the Ramsey Mountain road in the Cow Creek drainage on the Lemhi RA), should be protected from intensive livestock grazing. If trampling or grazing appears to be a problem, fence off part of the wetland. We also encountered wetland sites that had been fenced in the past to exclude livestock but where the fences were no longer intact (e.g., Mud Lake, Grouse Peak Lake). Wetland exclosures need to be maintained and monitored. It is also important that amphibian sites not become so overgrown with vegetation that they are no longer suitable for breeding.

6. ***Support/promote public education efforts concerning snakes to reduce persecution of snake populations.***

Persecution of snakes appears to be an important threat to snake populations. We repeatedly encountered reports of destruction of snake dens (by blasting, torching, or burying) and killing of snakes at dens and elsewhere. Although the aim may be to kill rattlesnakes, such persecution probably affects other species of snakes (such as Racers, Gopher Snakes, and Western Terrestrial Garter Snakes) because they may communally den with the rattlesnakes. Because snakes may annually migrate distances of up to 8 km (5 miles) one way, destruction of den sites may affect an area of many square miles. This is a difficult management issue but some means to stop persecution of snakes, particularly at den sites should be implemented.

Public education, concerning the ecological roles and economic benefits of snakes, an assessment of snake bite risk, how to minimize the occurrence of snake bite, and first aid measures, is probably the most effective long-term solution to this problem.

Acknowledgements

This study was funded by the Salmon-Challis National Forest, Salmon Office of the Bureau of Land Management, and the Herpetology Laboratory of Idaho State University. Dave Reeder, USFS, Jerry Gregson and Helen Ulmschneider, both BLM, initiated and diligently supported this study. Keith Johnson, BLM, and Carol Boyd, USFS, provided GIS coverages of the study area. P. J. Smith and Roy Churchwell, USFS, provided us with their historical observations of amphibians and reptiles in the area. We also thank the participants of the Idaho Rural Outreach in Science Education (IROSE) project for their contributions of information and effort to the data record. Numerous residents of Custer and Lemhi counties contributed observations of amphibians and reptiles which added immeasurably to our knowledge.

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Table 1. Amphibian survey data sheet instructions.

SECTION 1 – LOCALITY: These data are essential. Many amphibian surveys have been hampered by the inability to relocate exact locations in the historical record.

Date: Use the format DD-MMM-YY (e.g., 05-APR-98).

Begin Time: List the time survey of habitat for amphibians began in 24 hour format.

End Time: List the time the survey ended in 24 hour format. (The total time should reflect only the amount of time spent searching for amphibians. Total time plus number of observers may be used to assess relative abundance.)

Observers: List names or initials of all persons involved in searching.

Locality: Describe the specific geographic location of the site. Use air distance in directions (e.g., 5 km N and 7.5 km W) of a map landmark that likely will not change (distance from a large town or city is not all that helpful).

State: Use the 2-letter abbreviation.

County:

Map Name: List the name of the U.S.G.S. quadrangle or other map used to locate the site.

Owner: List the public land manager (e.g., Challis RA, Salmon-Challis Natl. Forest), or name of the owner if the site is on private land.

Elevation: Circle scale used, meters are preferred.

T: township **R**: range **S**: section

Section Description: Describe the location of the site within the section (e.g., SE1/4 or NE1/4 of SE1/4)

UTM Zone, Northing, Easting: Universal Transverse Mercator coordinates are preferred over longitude and latitude.

SECTION 2 – SPECIES DATA List all amphibian species observed. If garter snakes are seen, list them here also.

Species: Use the scientific name. Convenient shorthand is to use a 4-letter code made up of the first 2 letters of the genus and species (e.g., *Bufo boreas* would be BUBO).

Adults/Juveniles/Metamorphs/Larvae/Eggs: Indicate presence with a check, but numbers seen are more valuable data.

Calling: Indicate yes if frogs are vocalizing in a breeding chorus.

Technique(s): List how observations were made: visual/aural id, hand collected, dip net/seine, or trapped (minnow-type traps can be used for larvae)

Voucher: Indicate whether a voucher specimen was collected. Good photographs may substitute for physical specimens.

Fish Present: If yes, list species if you can. Circle the question marks if you are not certain, but suspect that fish are present.

Entire Site Searched?: If no, list either the meters of shoreline or the area (m^2) of habitat (e.g., amount of wet meadow) searched.

SECTION 3 – PHYSICAL AND CHEMICAL DATA Water chemistry data are difficult to collect accurately without quality equipment. Weather data are important for determining the quality of the observations (e.g., was an absence of amphibians due to observations made during a blizzard?)

Weather, Wind: Indicate atmospheric conditions.

Air Temperature: Take at chest height in shade. The Celsius scale is preferred.

Water Temperature: Take 1 m from margin and at 1 cm depth, or where egg masses are observed.

Color: This is a qualitative assessment of whether the water is clear or tea-colored form organic (humic) acids.

Turbidity: This is a qualitative assessment of whether the water is clear or clouded from suspended particulate matter.

SECTION 4 – HABITAT DESCRIPTION These data are important for developing hypotheses to explain changes in abundance of amphibians.

Origin: Decide whether the wetland is a natural geologic formation or man-made.

Drainage: Circle whether the site has permanent drainage, no drainage, or occasional drainage. Determining the potential for occasional drainage requires ju[illegible]. Look for clues in the topography and vegetation.

Site Type: Decide how best to describe the site. If there is evidence of past or present beaver activity, circle one of these choices in addition to your choice.

Site Length/Width: Record the maximum length and width of lakes and ponds. For streams, record the length and average width of the reach searched.

Stream Order: This is an index of stream size, and you will need a topographic map to determine it. First-order streams have no tributaries, second-order streams are formed by the confluence of two 1st –order streams, third-order streams are formed by the confluence of two 2nd-order streams , and so on.

Maximum Depth: Most times, you will not have access to a boat, so estimate depth (deep lakes are usually not important to amphibians).

Primary Substrate: Circle the type that covers the majority of the bottom of the site.

Emergent Vegetation: Circle the percentage of the margin of the site with emergent vegetation present, and list the dominant species. If you are unsure of species id, list the categories of the dominant species (e.g., cattail, sedges, etc.).

North Shoreline Characteristics: Circle whether shallows and emergent vegetation are present or absent. This is important in evaluating quality of breeding habitat in some mountain locations.

Forest Characteristics: List the closest distance between the water and the surrounding, and list the most common tree species. Leave these fields blank if there is no forest.

Table 2. Amphibians and reptiles of the study area: status and occurrence.

Common Name	Scientific Name	Abbreviation	Status[1]	Distribution	Estimated Abundance[2]	Successful Sampling Techniques	Comments
Confirmed							
Long-toed Salamander	*Ambystoma macrodactylum*	AMMA		Limited	Common	visual search, dip net	larvae
Tailed Frog	*Ascaphus truei*	ASTR		Limited	Unknown	visual search, dip net	
Western Toad	*Bufo boreas*	BUBO	BLM-S, SSC-C	Intermediate	Common	visual search, dip net, incidental	metamorphs, adults
Pacific Treefrog	*Pseudacris (=Hyla) regilla*	PSRE		Limited	Common	visual search ,dip net, automated recording, incidental	tadpoles, adults
Columbia Spotted Frog	*Rana luteiventris (=pretiosa)*	RALU	BLM-S, SSC-A, FSR4-S	Widespread	Common	visual search, dip net, incidental	tadpoles, juveniles, adults
Painted Turtle	*Chrysemys picta*	CHPI		Limited	Uncommon	visual search, incidental	adults
Short-horned Lizard	*Phrynosoma douglassii*	PHDO		Intermediate	Uncommon	visual search, incidental	adults
Sagebrush Lizard	*Sceloporus graciosus*	SCGR		Limited?	Common?	visual search, incidental	adults
Rubber Boa	*Charina bottae*	CHBO		Limited?	Uncommon?	visual search, incidental	adults
Racer	*Coluber constrictor*	COCO		Limited?	Uncommon?	visual search, incidental	juveniles, adults
Gopher Snake	*Pituophis catenifer*	PICA		Limited?	Uncommon?	visual search, incidental	adults
Western Terrestrial Garter Snail	*Thamnophis elegans*	THEL		Widespread	Common	visual search, incidental	juveniles, adults
Common Garter Snake	*Thamnophis sirtalis*	THSI		Limited	Uncommon	visual search, incidental	adults
Western Rattlesnake	*Crotalus viridis*	CRVI		Widespread	Uncommon	visual search, incidental	juveniles, adults
Possible							
Boreal Chorus Frog	*Pseudacris triseriata*	PSTR					
Bullfrog	*Rana catesbeiana*	RACA					
Northern Leopard Frog	*Rana pipiens*	RAPI	BLM-S, SSC-A				
Great Basin Spadefoot	*Scaphiopus intermontanus*	SCIN					
Western Skink	*Eumeces skiltonianus*	EUSK					
Western Fence Lizard	*Sceloporus occidentalis*	SCOC					
Ringneck Snake	*Diadophis punctatus*	DIPU	BLM-S, SSC-C				
Night Snake	*Hypsiglena torquata*	HYTO					

[1]BLM-S=Bureau of Land Management Sensitive Species
SSC-A=Idaho Dep. of Fish & Game Species of Special Concern (Priority Species)
SSC-C=Idaho Dep. of Fish & Game Species of Special Concern (Undetermined Status Species)
FSR4-S=Forest Service Region 4 Sensitive Species

[2]Estimate Abundance=Relative abundance in appropriate habitat for the species during the season when the species is active.

Table 3. Comparison of physical and chemical attributes of survey sites occupied by amphibian species to all sites surveyed. For complete details see Appendix II-V.

Attribute	Elevation (m)	Water Temperature (C)	pH	Conductivity (uS/cm)
All Sites (70)[1]	1,146-2,926	4-29	7.2-9.7	1-280
Long-toed Salamander (3)	2134-2390	15-21		4-130
Western Toad (1)	2304	21	9.1	5
Pacific Treefrog (1)	1228	29		110
Columbia Spotted Frog (14)	1158-2512	9-25	7.2-9.3	4-280

[1]Number in parenthesis = number of sites

Table 4. Proposed sites for long-term monitoring. Location information has been generalized where a complex of sites have been combined.

Site No.	Locality	County	Map Name	Elevation (m)	Twnshp	Range	Section	UTM Zone	Northing	Easting
CHALLIS RESOURCE AREA										
6	Lake Cr. beaver pond	Custer	Herd Lake	1999	9N	19E	15	11	4887200	723500
7	Herd Lake, south shore	Custer	Herd Lake	2187	9N	19E	25	11	4885100	726550
9	Horse Basin/Corral Basin exclosure	Custer	Paint Pot	1951	10N	19E	13,14,22, 23	11	4895000 4898000	724000- 726000
13, 14, 58	Thousand Springs - Chilly Slough marsh complex	Custer	Dickey Peak et al.	1915	10N	21E	34,35	12	4892600	263700
21, 22, 23, 24, 25, 26, 69, 70	Spring Hill pond complex	Custer	Spring Hill	2150	11N	23E	10	12	4907900	282800
37	Burnt Cr. Lake	Custer	Burnt Creek	2499	9N	24E	4	12	4890850	289800
38	Burnt Cr. exclosure	Custer	Burnt Creek	2304	10N	24E	20	12	4895700	288400
39	Summit Cr.	Custer	Moffet Springs	1951	11N	25E	22,23	12	4905200	304000
41, 42, 43, 44	South Butte Mine pond complex	Custer	Clayton	2150	11N	17E	15	11	4906400	703750
49	Horse Basin pond	Custer	Horse Basin	2341	10N	20E	23	11	4895484	734981
65, 66	Bear Cr. Pond complex	Custer	Jerry Peak	2310	9N	20E	8	11	4889451	730647
2	McGowan Cr. stock pond	Custer	Antelope Flat	1849	12N	20E	36	11	4912900	735300
29	upper Road Cr. pond	Custer	Horse Basin	2377	10N	21E	31	11	4893450	737750
LEMHI RESOURCE AREA										
16	Texas Cr.	Lemhi	Gilmore	2073	13N	27E	5	12	4927900	320500
17, 18	Eighteenmile Cr.pond & bogs	Lemhi	Cottonwood Creek	2390	13N	28E	1	12	4927250	335300
20	Hot Springs Cr. Tule marsh	Lemhi	Sal Mountain	1256	21N	22E	28	12	5000000	274400
51	Yearian pond	Lemhi	Agency Creek	1939	18N	24E	13	12	4973200	298800
52	Yearian pond	Lemhi	Agency Creek	1926	18N	24E	13	12	4973100	298300
53	Hyde Cr. pond	Lemhi	Williams Lake	1317	20N	22E	5	12	4997200	273300
56	Warm Springs Cr. - ponds	Lemhi	Williams Lake	1228	21N	22E	29	12	5000100	273807
57	Tower Slough pond	Lemhi	Bird Creek	1158	23N	22E	18	12	5023396	272134
59, 60, 61	Birch Cr. CA marsh complex	Lemhi	Italian Canyon	1985	11N	29E	27	12	4902293	341061
62	Cow Cr. pond	Lemhi	Agency Creek	1951	18N	24E	12	12	4975661	298449
LOST RIVER MOUNTAINS										
31	Mud Lake	Butte	Methodist Creek	2266	8N	25E	36	12	4872800	305900
32	Twin Lakes	Butte	Methodist Creek	2190	7N	25E	1	12	4871000	305000
27	Carlson Lake	Custer	Doublespring	2487	11N	23E	17	12	4906600	280400
33	Doublesprings	Custer	Doublespring	2094	12N	23E	31	12	4911000	277700
34	Mud Spring exclosure	Custer	Burnt Creek	2353	10N	23E	9	12	4898900	281500
45	Grouse Cr. Lake	Custer	Meadow Peak	2560	12N	21E	3	12	4920400	264200
47	Wino Basin	Custer	Meadow Peak	2809	12N	21E	3	12	4921400	263100
63	Grouse Cr. pond	Custer	Meadow Peak	2304	12N	21E	11	12	4919303	265947
67	Merriam Lake	Custer	Elkhorn Creek	2926	9N	23E	17	12	4887776	279610

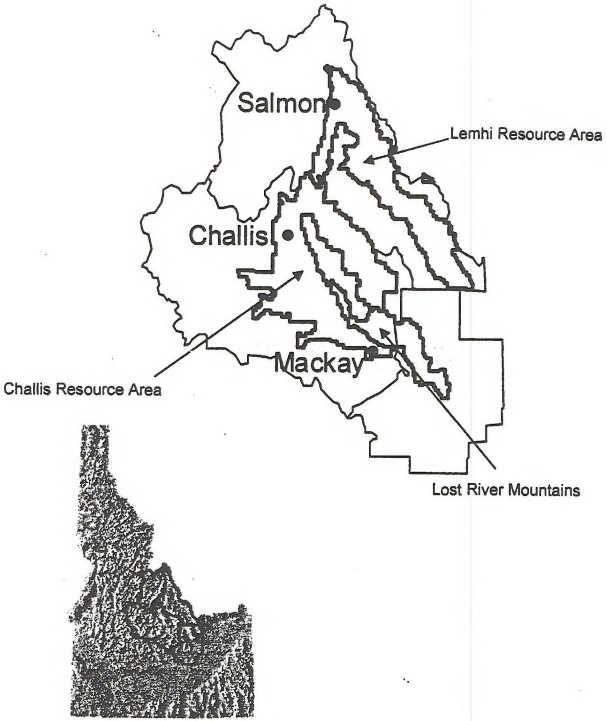

Figure 1. Study area boundaries delineating BLM Challis and Lemhi Resource Areas, and boundaries of USFS lands in the Lost River Mountains (Challis Ranger District on the north end and Lost River Ranger District on the south end).

Figure 2. 'AMPHIBIAN SURVEY DATA SHEET - modified after S.P. Corn, NBS, Fort Collins, CO (ver. 1 May 1996)

Herpetology Laboratory, Idaho State University and Idaho Museum of Natural History, Box 8007, Pocatello, ID 83209
(208) 236-3922 voice 236-4570 FAX e-mail: petecher@isu.edu

DATE		BEGIN TIME		END TIME		OBSERVERS		
LOCALITY								
STATE		COUNTY		MAP NAME		OWNER		ELEVATION
T	R	S		UTM ZONE/DATUM		NORTHING		EASTING

AMPHIBIAN AND REPTILE SPECIES PRESENT (INDICATE NUMBERS IN CATEGORIES IF POSSIBLE)

SPECIES	ADULT	JUVENILE	METAM.	LARVAE	EGGS	CALLING	TECHNIQUE(S)	VOUCHER

FISH PRESENT:	YES	???	NO	FISH SPECIES:		
ENTIRE SITE SEARCHED?	YES	NO	IF NO, IDICATE AREA:			meters of shoreline habitat
WEATHER:	RADIATION:	CLEAR	PARTIAL	OVERCAST	WIND:	CALM LIGHT MEDIUM HEAVY
AIR TEMPERATURE (1 M SHADED)	°C OR F		% CLOUD COVER:		PRECIPTATION:	SNOW RAIN
WATER	TEMPERATURE (1CM)		pH:	CONDUCTIVITY	SAMPLE?	
	COLOR	CLEAR	STAINED	TURBIDITY	CLEAR	CLOUDY
SITE DESCRIPTION:	PUT SKETCH AND ADDITIONAL COMMENTS ON BACK OF SHEET					
ORIGIN	NATURAL	MAN-MADE	MAN-MODIFIED	DRAINAGE	PERMANENT	OCCASIONAL NONE
SITE TYPE	TEMPORARY or PERMANENT LAKE/POND	MARSH	BOG	STREAM	SPRING/SEEP	ACTIVE or INACTIVE BEAVER POND

NATIONAL WETLAND INVENTORY CLASIFICATION	GAP ANLYSIS COVER TYPE (IF KNOWN)

STREAM ORDER	1	2	3	4	5	6

SITE LENGTH	m	SITE WIDTH	m	MAXIMUM DEPTH	< 1M	1 - 2 M	> 2 M

PRIMARY SUBSTRATE SILT/MUD SAND/GRAVEL COBBLE BOULDER/BEDROCK OTHER:

% OF LAKE MARGIN WITH EMERGENT VEGETATION	0	1 - 25	25 - 50	>50
EMERGENT VEGETATION SPECIES (IN ORDER OF ABUNDANCE)				

NORTH SHORELINE CHARACTERISTICS	SHALLOWS PRESENT	SHALLOWS ABSENT	EMERGENT VEG PRESENT	EMERGENT VEG ABSENT
DISTANCE TO FOREST EDGE m	FOREST TREE SPECIES			

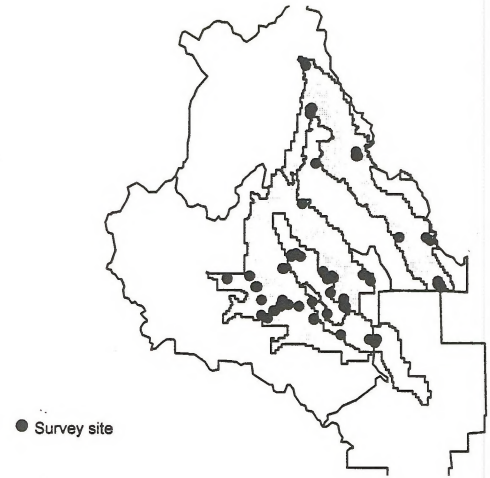

Figure 3. Distribution of survey site locations within the study area.

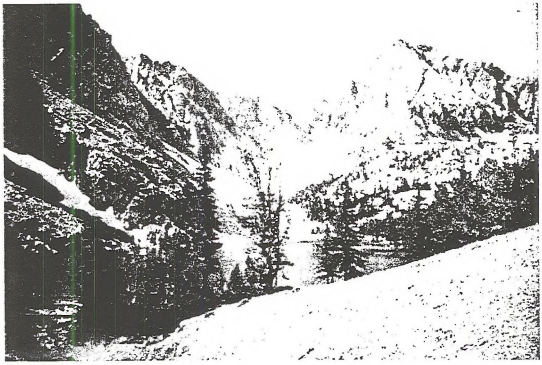

Figure 4a. Merriam Lake (Survey Site No. 67; el. 2926 m). A cirque lake in the Lost River Range, no amphibians were detected here and fish were abundant.

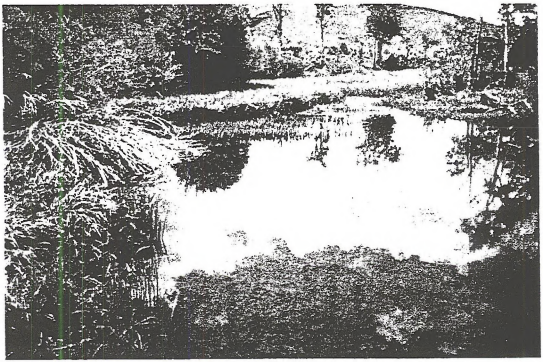

Figure 4b. A permanent pond at Spring Hill (Survey Site No. 24; el. 2182 m) which provided habitat for Western Terrestrial Garter Snakes. No amphibians were detected.

Figure 4c. South Butte Mine seasonal pond (Survey Site No. 41, el. 2134 m), west of Clayton, Custer Co. Long-toed Salamander larvae were abundant here in early July, 1996.

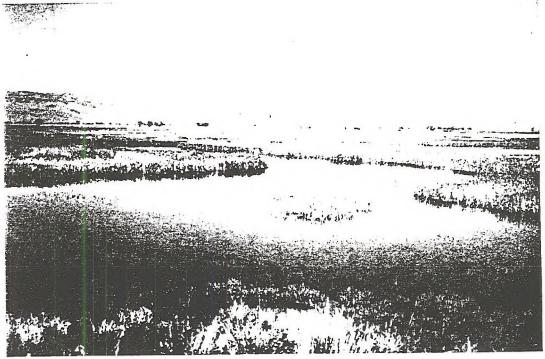

Figure 4d. Chilly Slough Conservation Area (Survey Site No. 58, el. 1914 m), a large cattail/sedge marsh which provided habitat for Columbia Spotted Frogs.

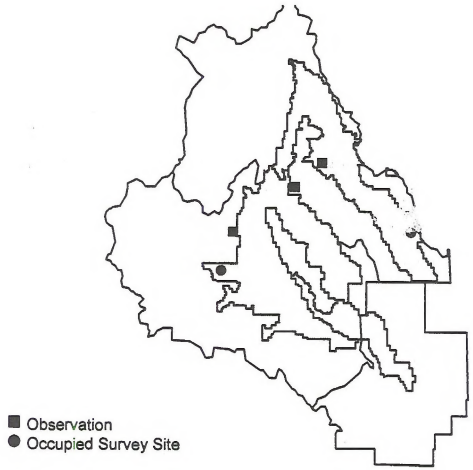

Figure 5. Long-toed Salamander observation and occupied survey site locations within the study area.

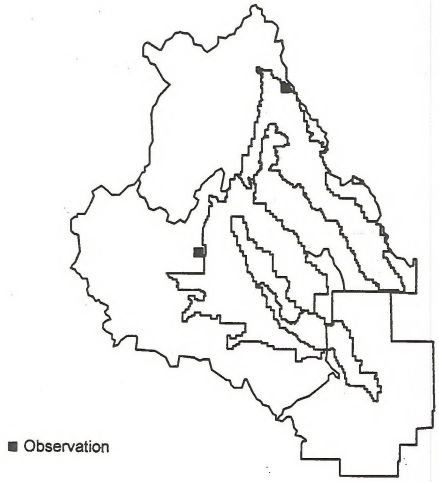

Figure 6. Tailed Frog observations within and immediately adjacent to the study area.

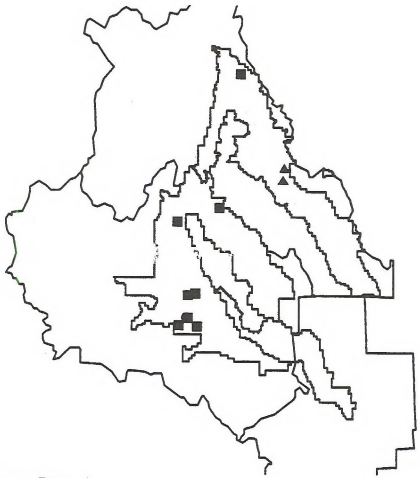

Figure 7. Western Toad museum record locations, observations, and occupied survey sites within the study area.

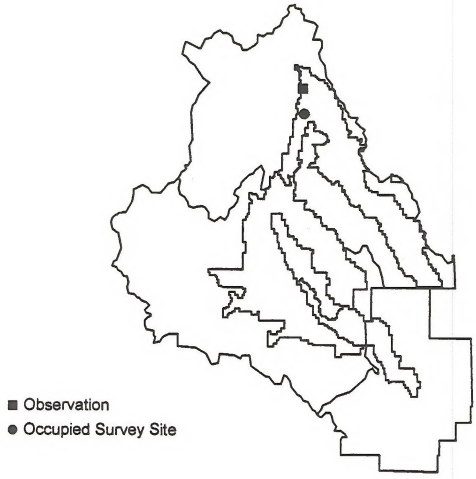

Figure 8. Pacific Treefrog observation and occupied survey site locations within the study area.

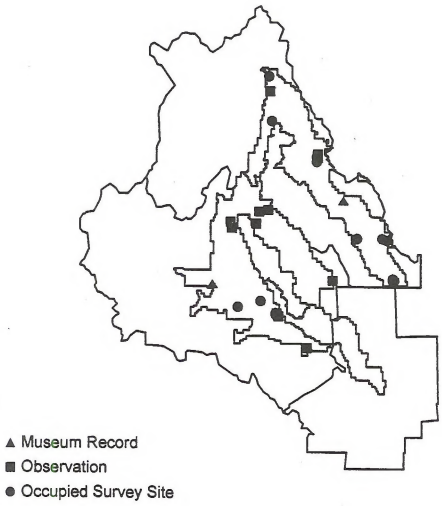

Figure 9. Columbia Spotted Frog museum record locations, observation, and occupied survey sites within the study area.

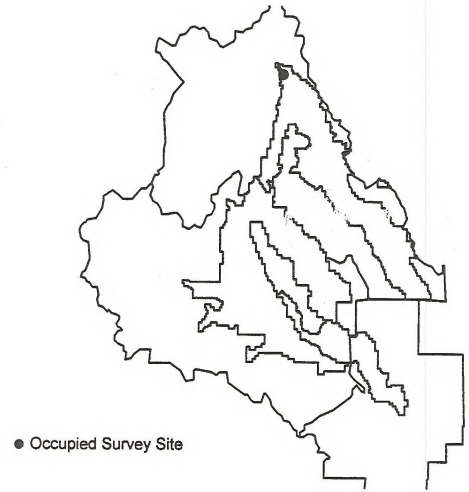

Figure 10. Painted Turtle occupied survey site location within the study area.

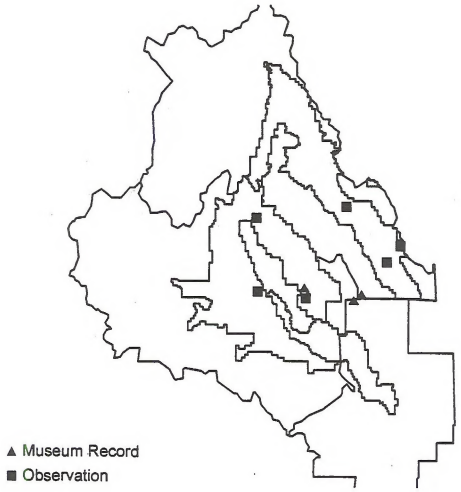

Figure 11. Short-horned Lizard museum record locations and observations within and immediately adjacent to the study area.

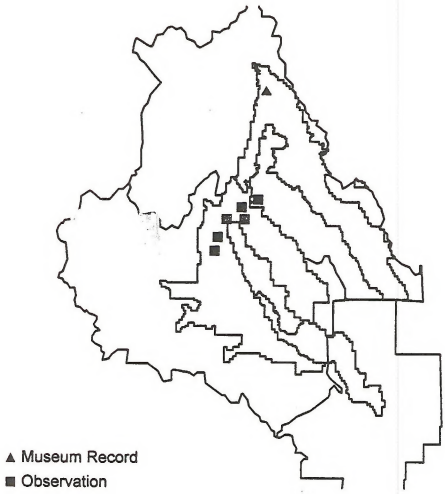

Figure 12. Sagebrush Lizard museum record and observation locations within the study area.

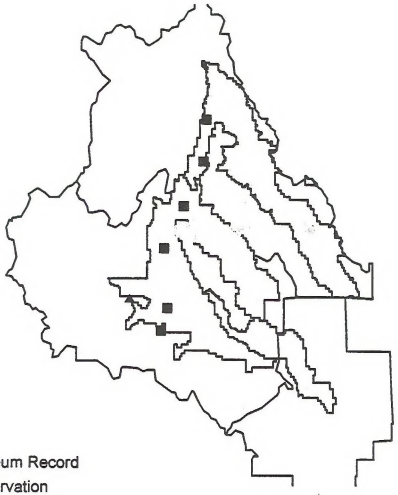

Figure 13. Rubber Boa museum record and observation locations within the study area.

Figure 14. Racer museum record and observation locations within the study area.

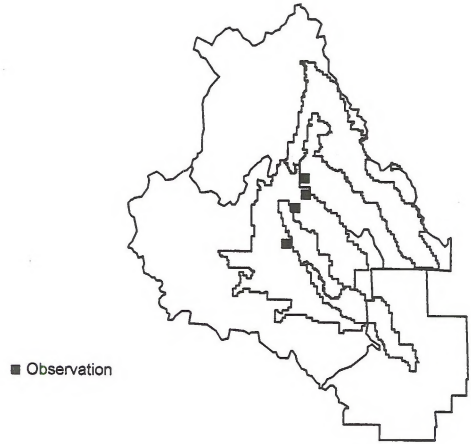

Figure 15. Gopher Snake observation locations within the study area.

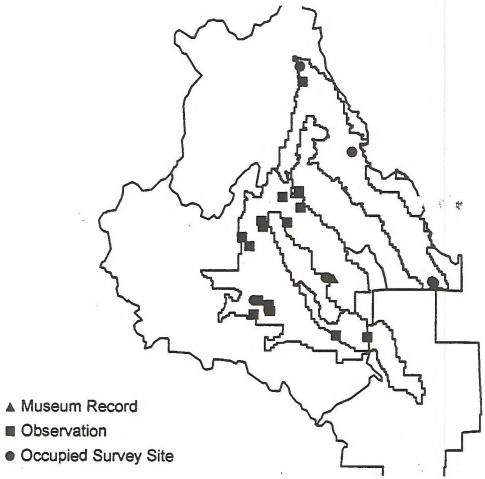

Figure 16. Western Terrestrial Garter Snake museum record, observation, and occupied survey site locations within the study area.

Figure 17. Common Garter Snake museum record and observation locations within the study area.

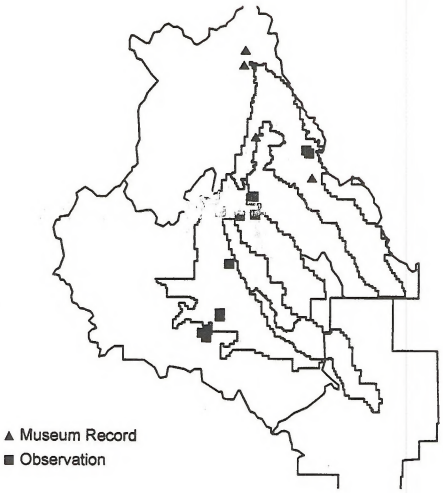

Figure 18. Western Rattlesnake museum record and observation locations within and immediately adjacent to the study area.

Appendix I. Summary of museum, observation, and 1996-97 survey records of amphibian and reptile occurrence within the study area.

GENUS	SPECIES	YEAR	DATE	RECORD TYPE*	LOCALITY	UTM ZONE	EASTING (m)	NORTHING (m)	COUNT	LIFE STAGE	HABITAT	OBSERVER
Ambystoma	macrodactylum	1995	8-Aug	O	Basin Cr.	12	284700	4969650	10	larvae	high elevation pond	K. Jensen, N. Ady, A. Perry
Ambystoma	macrodactylum	1996	11-Jun	S	Eighteenmile Cr.	12	335300	4927250	~100	larvae	pond	J. Yeo, J. Morache
Ambystoma	macrodactylum	1996	9-Jul	S	South Butte Mine pond	11	703750	4906400	>100	larvae	carex pond	J.Yeo
Ambystoma	macrodactylum	1996	9-Jul	S	South Butte Mine pond	11	704100	4906900	>100	larvae	carex pond	J. Yeo
Ascaphus	truei	1980	Aug	O	Freeman Cr.	12	283900	5016300	1	adult	Douglas fir	P.J. Smith
Bufo	boreas	1944	14-Jul	M	Peterson's Creek	12	301707	4959318	1		riparian	
Bufo	boreas	1959	25-Aug	M	Peterson's Creek	12	302945	4965244	1		riparian	
Bufo	boreas	1994	23-Jun	O	Bear Cr. Key area	11	730400	4889500	1	adult		Blackstun
Bufo	boreas	1994	11-Jul	O	Bear Cr. Key area	11	730293	4889600	1	adult	in aquatic veg in creek	Madden
Bufo	boreas	1996	12-Jun	O	Horse Basin Spring No. 1	11	734400	4896000	dozens	metamorph	sedges near spring	W. C. Osborne
Bufo	boreas	1996	17-Jul	O	Sage Cr.	11	735450	4885500	1	adult	riparian	J. Gregson
Bufo	boreas	1996	Summer	O	Raindrop Spring	12	282100	5013750	3	adult	spring box	H. Ulmschneider
Bufo	boreas	1996	5-Aug	O	Herd Lake	11	726200	4885500	1	adult	lake	R. Churchwell
Bufo	boreas	1997	30-Jul	O	Brokan Wagon Cr.	11	733450	4902000	1	adult	riparian?	J. Gregson
Bufo	boreas	1997	11-Jun	O	Corral Basin	11	730300	4901000	3	adult	riparian	W. C. Osborne
Bufo	boreas	1997	22-Aug	S	Bear Cr.	11	730497	4889482	3	metamorph	pond	J. Yeo
Charina	bottae	1968	10-Aug	M	3 mi SW of Clayton	11	704196	4900204	1			
Charina	bottae	1994	11-Jul	O	Road Cr. Near Horse Basin Cr.	11	723702	4895253	1	adult	road along riparian	S. Bosse
Charina	bottae	1994	14-Sep	O	Perrau Cr. Road	12	268968	4997689	1	juvenile	riparian corridor in steep canyon w/ sagebrush above	H. Ulmschneider
Charina	bottae	1994	21-May	O	Warm Spring Cr.	12	267000	4975600	1	adult	riparian area in rocky canyon	S. Bosse
Charina	bottae	1995	9-Aug	O	ew of Ellis Cr.	11	730840	4951120	1	adult	sagebrush habitat	M. Weston
Charina	bottae	1996	14-Jul	O	Challis Buffalo Jump	11	721550	4927800	1	adult	greasewood adjacent cliffs	J. Yeo
Chrysemys	picta	1997	14-May	S	Tower Slough pond	12	272134	5023396	3	adult	pond	J. Yeo
Coluber	constrictor	1960	17-Sep	M	10 mi N of Salmon, Hwy 93	12	272550	502[illegible]647	1			
Coluber	constrictor	1993	27-Aug	O	Cow Cr.	12	262800	4[illegible]50	1		riparian	Bird/Weston
Coluber	constrictor	1996	21-Sep	O	Spring Gulch	11	725650	4[illegible]50	2	adult, juvenile	cottonwood riparian	J. Yeo
Coluber	constrictor	1997	7-May	O	Spring Gulch	11	725200	4[illegible]950	1	adult	sagebrush/greasewood	J. Yeo
Crotalus	viridis	1954	25-Aug	M	Reese Cr.	12	301014	4965568	1			
Crotalus	viridis	1987	31-May	M	12 Mile Cr., road	12	270530	4983260	1	adult		B. Harmon
Crotalus	viridis	1996	5-Jun	O	Road Cr.	11	727400	48[illegible]2400	1	adult	road	J. Yeo
Crotalus	viridis	1996	19-Jul	O	Agency Cr.	12	297100	4983250	1	adult	road along riparian	J. Yeo
Crotalus	viridis	1996	19-Jul	O	Cow Cr.	12	298600	4978850	1	adult	road along riparian	J. Yeo
Crotalus	viridis	1996	21-Sep	O	Spring Gulch	11	725500	4947700	1	adult	sagebrush/greasewood	J. Yeo
Crotalus	viridis	1997	3-Jun	O	Highway 93 north of Grandview Canyon	11	731600	4919742	1	adult	sagebrush	C. Peterson, J. Yeo
Crotalus	viridis	1997	18-Aug	O	Bear Cr.	11	727750	4890600	1	adult	riparian	J. Yeo
Phrynosoma	douglassi	1956	19-Aug	M	upper Pahsimeroi valley	12	286078	4907386	2			
Phrynosoma	douglassi	1957	9-Jun	M	upper Pahsimeroi valley	12	286078	4907386	1			
Phrynosoma	douglassi	1959	7-May	M	Big South Flat Rise, upper Pahsimeroi	12	286078	4907386	2			

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Appendix I. Summary of museum, observation, and 1996-97 survey records of amphibian and reptile occurrence within the study area.

GENUS	SPECIES	YEAR	DATE	RECORD TYPE*	LOCALITY	UTM ZONE	EASTING (m)	NORTHING (m)	COUNT	LIFE STAGE	HABITAT	OBSERVER
Phrynosoma	douglassi	1959	13-Aug	M	Summit Cr. Drainage, east ledge	12	316836	4902914	1			
Phrynosoma	douglassi	1961	23-May	M	upper Pahsimeroi valley	12	286078	4907386	4			
Phrynosoma	douglassi	1961	26-Jun	M	Summit Cr. Drainage	12	312729	4899945	1			
Phrynosoma	douglassi	1993	4-Aug	O	Leadore dumpster site	12	309800	4949900	1	adult		H. Ulmschneider
Phrynosoma	douglassi	1997	3-Jun	O	Sheep Creek/Willow Cr. Summit	11	738984	4905352	1	adult	sagebrush	C. Gertschen, C. Peterson
Phrynosoma	douglassi	1997	Aug	O	Mud Cr. -- Birch Cr. Valley	12	330100	4919100	3	adult	sagebrush/AGSP	H. Ulmschneider
Pituophis	catenifer	1997	3-Jun	O	Grand View Canyon	11	733729	4915795	1	adult	rock cliff	J. Yeo, C. Peterson
Pseudacris	regilla	1997	13-May	S	Salmon Airport	12	272807	5000100	4	larvae	greasewood pond	J. Yeo
Pseudacris	regilla	1997	5-Jun	O	Morgan Bar Recreation Area	12	271970	5014978	>10	larvae	puddles	C. Peterson, J. Yeo
Rana	luteiventris	1959	29-Jul	M	E. Fk. Salmon R.	11	714799	4902618	1			
Rana	luteiventris	1964	20-Jun	M	Mackay	12	290102	4865360	2			
Rana	luteiventris	1992	15-Jul	O	Trail Cr. ACEC	12	274800	4970300	21	adult, larvae	boggy meadow	B. Wolcott
Rana	luteiventris	1994	27-May	O	Thousand Springs	12	272231	4885274	3	adult	cattail/Carex wetland	J. Gregson
Rana	luteiventris	1996	11-Oct	O	Whiskey Springs	12	272050	4885800	dozens	adult	spring head, sand bottom	J. Gregson
Rana	luteiventris	1996	2-Aug	O	Pennal Gulch	11	724000	4935500	4	adult	marshy pond	R. Churchwell
Rana	luteiventris	1996	11-Jun	S	Eighteenmile Cr.	12	337750	4925850	2	adult	riparian	J. Yeo, J. Moracho
Rana	luteiventris	1996	11-Jun	S	Eighteenmile Cr.	12	335300	4927250	2	adult	pond	J. Yeo, J. Moracho
Rana	luteiventris	1996	10-Jun	S	Texas Cr.	12	320500	4927800	1	adult	stream	J. Yeo, J. Moracho
Rana	luteiventris	1996	7-Jun	S	Thousand Springs	12	263700	4892600	6	adult	spring pools	J. Yeo, C. Bolin
Rana	luteiventris	1996	7-Jun	S	Whiskey Springs	12	272200	4885600	1	adult	quaking bog	J. Yeo, C. Bolin
Rana	luteiventris	1996	20-Jul	S	Yearian pond	12	296300	4973100	2	adult	lake	J. Yeo
Rana	luteiventris	1996	22-Aug	S	Hyde Cr. Pond	12	273300	4997200	4	adult	pond	J. Yeo
Rana	luteiventris	1996	4-Jun	O	Pahsimeroi Fish Hatchery rearing ponds	12	263208	4945163	>1	adult	pond	C. Peterson, J. Yeo
Rana	luteiventris	1997	5-Jun	O	Morgan Bar Recreation Area	12	271970	5014978	1	adult	riparian	C. Peterson, J. Yeo
Rana	luteiventris	1997	26-Jun	O	Chilly Slough	12	272450	4884200	1	adult	sedge bog	J. Yeo
Rana	luteiventris	1997	16-Jul	O	Ramsey Mtn. Road	12	298425	4975647	1	adult	ephemeral bog	J. Yeo, J. Moracho
Rana	luteiventris	1997	Apr	O	Cow Cr.	12	298800	4977100	many	eggs	ephemeral pond	H. Ulmschneider
Rana	luteiventris	1997	14-May	S	Tower Slough pond	12	272134	5023396	>10	larvae	puddles	J. Yeo
Rana	luteiventris	1997	15-Jul	S	Birch Cr. Cons. Area	12	341583	4902021	>20	larvae	stream	J. Yeo
Rana	luteiventris	1997	15-Jul	S	Birch Cr. Cons. Area	12	340802	4903344	1	adult	carex bog	J. Yeo, J. Moracho
Rana	luteiventris	1997	15-Jul	S	Birch Cr. Cons. Area	12	341061	4902293	5	adult	stream	J. Yeo, J. Moracho
Rana	luteiventris	1997	16-Jul	S	Cow Cr.	12	298449	4975861	13	adult, larvae	pond	J. Yeo, J. Moracho
Rana	luteiventris	1997	22-Aug	S	Bear Cr.	11	730497	4889482	>20	larvae	pond	J. Yeo

*M = Museum record, O = Observation record, S = Survey Site record

Appendix I. Summary of museum, observation, and 1996-97 survey records of amphibian and reptile occurrence within the study area.

GENUS	SPECIES	YEAR	DATE	RECORD TYPE*	LOCALITY	UTM ZONE	EASTING (m)	NORTHING (m)	COUNT	LIFE STAGE	HABITAT	OBSERVER
Rana	luteiventris	1997	13-Jul	S	Chilly Slough	12	271979	4884876	>100	adult, larvae	marsh	J. Yeo, J. Morache
Rana	luteiventris			M	Leadore	12	313348	4950145	2			R.L.
Sceloporus	graciosus	1996	15-Aug	O	near Challis Buffalo Jump	11	721350	4927500	1	adult	sagebrush/greasewood	M. Morache
Sceloporus	graciosus	1996	27-Aug	O	near Gerry Gulch	11	727250	4944900	1	adult	ARTRW/Atriplex/AGSP	J. Yeo, J. Morache
Sceloporus	graciosus	1996	8-Sep	O	near Gerry Gulch	11	726850	4945500	1	adult	ARTRW/AGSP/POSA	J. Yeo, J. Morache
Sceloporus	graciosus	1997	4-Jun	O	north of Pahsimeroi Fish Hatchery	11	735030	4951871	>1	adult	sagebrush	C. Peterson, J. Yeo
Sceloporus	graciosus			M	Carmen Cr.	12	275354	5014651	2			R.L.
Thamnophis	elegans	1959	12-Aug	M	upper Pahsimeroi valley	12	286078	4907386	1	adult		
Thamnophis	elegans	1996	5-Jun	O	near junction of Road Cr. & Horse Basin Cr.	11	723600	4895250	1	adult	riparian	J. Yeo, C. Bolin
Thamnophis	elegans	1996	5-Jun	O	Road Cr.	11	729300	48[illegible]750	1	adult	road	J. Yeo, C. Bolin
Thamnophis	elegans	1996	22-May	O	Lake Cr.	11	721200	4[illegible]300	1	adult	riparian	J. Yeo
Thamnophis	elegans	1996	25-Jul	O	Upper Cedar Cr.	12	286000	4[illegible]30	1	adult	riparian	J. Yeo
Thamnophis	elegans	1996	5-Jun	S	Road Cr.	11	722000	4[illegible]000	1	adult	riparian	J. Yeo, C. Bolin
Thamnophis	elegans	1996	21-Aug	S	Tower Cr. Bottoms	12	272200	50[illegible]400	1	adult	marsh	J. Yeo
Thamnophis	elegans	1996	5-Jun	O	Morgan Bar Recreation Area	12	271970	50[illegible]976	1	adult	pond	C. Peterson, J Yeo
Thamnophis	elegans	1997	4-Jun	O	Pahsimeroi Fish Hatchery	11	734585	4951962	2	adult	riparian	C. Peterson, J. Yeo
Thamnophis	elegans	1997	5-Aug	O	Pass Cr. Road	12	303383	4874378	1	adult	road	J. Yeo, J. Morache
Thamnophis	elegans	1997	11-May	O	Garden Cr. Road	11	713250	4928950	1	adult	road along riparian	J. Yeo
Thamnophis	elegans	1997	17-Apr	O	Birch Cr.	11	717486	4924567	1	adult	rocky sagebrush	J. Yeo
Thamnophis	elegans	1997	18-Aug	O	S. Fk. Bear Cr.	11	730700	4889400	1	adult	riparian - pond	J. Yeo, J. Morache
Thamnophis	elegans	1997	15-Jul	S	Birch Cr. Cons. Area	12	340802	4903344	1	adult	carex bog	J. Yeo, J. Morache
Thamnophis	elegans	1997	15-Jul	S	Birch Cr. Cons. Area	12	341061	4902293	1	adult	stream	J. Yeo, J. Morache
Thamnophis	elegans	1997	16-Jul	S	Cow Cr.	12	298449	4975661	5	adult	pond	J. Yeo, J. Morache
Thamnophis	elegans	1997	24-Jul	S	Spring Hill	12	283428	4907289	2	adult	pond	J. Yeo
Thamnophis	elegans	1997	24-Jul	S	Spring Hill	12	282173	4907387	1	adult	pond	J. Yeo
Thamnophis	elegans	1997	22-Aug	S	Bear Cr.	11	730497	4889482	6	adult, juvenile	pond	J. Yeo
Thamnophis	sirtalis	1955	6-May	M	1 mi S of Carmen	12	272934	5012468	1			Rudolph
Thamnophis	sirtalis	1997	5-Jun	O	Morgan Bar Recreation Area	12	271970	5014976	1	adult	riparian	J. Ingram

*M = Museum record, O = Observation record, S = Survey Site record

Appendix Ia. Summary of recent observations by area residents of amphibians and reptiles within the study area.

GENUS	SPECIES	DATE	LOCALITY	UTM ZONE	EASTING (m)	NORTHING (m)	COUNT	HABITAT	OBSERVER
Ambystoma	macrodactylum		Cow Cr.	12	268100	4955800	1		J. Madsen, May
Ambystoma	macrodactylum	7/5/97	3 km S. of Poison Cr.				>100	small pond on E. side of Hwy. 93	P. J. Smith, Challis
Bufo	boreas	1990	Little Morgan Cr.	12	268550	4946100	1		J. Madsen, May
Bufo	boreas	1994-96	Salmon River	11	723500	4938950		riparian-meadow	J. Alder, Challis
Charina	bottae		Herd Cr.	11	721350	4883100	1	riparian	R. Churchwell, Challis
Coluber	constrictor		Cow Cr.	12	268100	4955800	1		J. Madsen, May
Crotalus	viridis	1990	Little Morgan Cr.	12	268550	4946100	1		J. Madsen, May
Crotalus	viridis		Cow Cr.	12	268100	4955800	1		J. Madsen, May
Crotalus	viridis		Herd Cr.	11	721350	4883100	1	riparian	R. Churchwell, Challis
Crotalus	viridis		Anderson Spring	12	260450	4945900	1		J. Madsen, May
Crotalus	viridis	Aug-93	Fall Cr., Pahsimeroi	12	280000	4939000	4	riparian	P. J. Smith, Challis
Crotalus	viridis	6/23/97	N. end of Cronk's Canyon	11	737000	4957000	1	river canyon	P. J. Smith, Challis
Phrynosoma	douglassi	1997	upper Pahsimeroi valley	12	286000	4901500	>1	ARAR	T. Craig, Tendoy
Phrynosoma	douglassi		Anderson Spring	12	260450	4945900	1		J. Madsen, May
Phrynosoma	douglassi	1973	Pass Cr.	12	338000	4928000	1		P. J. Smith, Challis
Pituophis	catenifer		S. Fk. Lawson Cr.	12	261200	4938250	1		J. Madsen, May
Pituophis	catenifer	1990	Little Morgan Cr.	12	268550	4946100	1		J. Madsen, May
Pituophis	catenifer		Cow Cr.	12	268100	4955800	1		J. Madsen, May
Rana	luteiventris	1990	Little Morgan Cr.	12	268550	4946100	1		J. Madsen, May
Rana	luteiventris		S. Fk. Lawson Cr.	12	261200	4938250	1		J. Madsen, May
Rana	luteiventris	1994-96	Salmon River	11	723500	4938950		riparian-meadow	J. Alder, Challis
Rana	luteiventris	6/4/97	Lambson's pond	12	288600	4865000	>1	pond	C. Kimball, Mackay
Rana	luteiventris	7/13/97	150 m S. of Barney Hot Springs	12	305000	904000	8	sagebrush bottom w/ small stream	P. J. Smith, Challis
Sceloporus	graciosus		Piva Ranch	11	722550	935450	1		K. Piva, Challis

Appendix Ia. Summary of recent observations by area residents of amphibians and reptiles within the study area.

GENUS	SPECIES	DATE	LOCALITY	UTM ZONE	EASTING (m)	NORTHING (m)	COUNT	HABITAT	OBSERVER
Sceloporus	graciosus		Cow Cr.	12	268100	4955800	1		J. Madsen, May
Sceloporus	graciosus		Anderson Spring	12	260450	4945900	1		J. Madsen, May
Thamnophis	elegans	1990	Little Morgan Cr.	12	268550	4946100	1		J. Madsen, May
Thamnophis	elegans		Salmon River	11	724400	4935200	1	riparian	K. Piva, Challis
Thamnophis	elegans		Cow Cr.	12	268100	4955800	1		J. Madsen, May
Thamnophis	elegans		S. Fk. Lawson Cr.	12	261200	4938250	1		J. Madsen, May
Thamnophis	elegans	1994-96	Salmon River	11	723500	4938950		riparian-meadow	J. Alder, Challis

Appendix II. Summary of survey site localities.

Site No.	Date	Locality	Begin Time	End Time	Observer	State	County	Map Name	Owner	Elevation (m)	Twnshp	Range	Section	Aliquot	UTM Zone	Northing (m)	Easting (m)
1	5/16/96	Freighter Spring Exclosure	915	940	J. Yeo	ID	Custer	Borah Peak	FS	2134	10N	22E	28		12	4894500	271700
2	5/16/96	McGowan Cr. stock pond	1130	1150	J. Yeo	ID	Custer	Antelope Flat	BLM	1849	12N	20E	36	nwnwnw	11	4912900	735300
3	5/16/96	Antelope Flat carex bog	1300	1330	J. Yeo	ID	Custer	Antelope Flat	BLM	1871	12N	20E	35	sw	11	4912800	734200
4	5/17/96	Alkali Spring exclosure	845	955	J. Yeo	ID	Custer	Bald Mtn.	BLM	1737	11N	18E	12	sw	11	4908000	718200
5	5/17/96	Ryegrass Spring exclosure	1030	1050	J. Yeo	ID	Custer	Paint Pot	BLM	1865	11N	19E	32	neswne	11	4902300	720550
6	5/22/96	Lake Cr. beaver pond	1000	1045	J. Yeo	ID	Custer	Herd Lake	BLM	1999	9N	19E	15	swsw	11	4887200	723500
7	5/22/96	Herd Lake, south shore	1130	1200	J. Yeo	ID	Custer	Herd Lake	BLM	2187	9N	19E	25	nwnwnw	11	4885100	726550
8	6/5/96	Bear Cr. Pond	1700	1720	J. Yeo	ID	Custer	Paint Pot	BLM	2219	9N	20E	8	seswnw	11	4889600	729850
9	6/5/96	Horse Basin/Corral Basin exclosure	1300	1400	J. Yeo	ID	Custer	Paint Pot	BLM	1951	10N	19E	13,14,22, 23		11	4895000-4898000	722000-726000
10	6/5/96	lower Road Cr.	1200	1300	J. Yeo	ID	Custer	Paint Pot	BLM	1890	10N	19E	21,22		11	4895000-4896000	722000-724000
11	6/5/96	White Colt Spring	1115	1130	J. Yeo	ID	Custer	Paint Pot	BLM	1951	11N	19E	32	nwnenw	11	4902750	719750
12	6/6/96	Little Morgan Cr.			J. Yeo	ID	Lemhi	Ennis Gulch	BLM	1659	15N	21E	11	nene	12	4948000	267500
13	6/7/96	Thousand Springs	1145	1420	J. Yeo	ID	Custer	Dickey Peak	BLM	1917	10N	21E	34,35		12	4892600	263700
14	6/7/96	Whiskey Springs	1530	1600	J. Yeo	ID	Custer	Elkhorn Creek	BLM	1914	9N	22E	22	swswsw	12	4885600	272200
15	6/8/96	Crane Basin			C. Bolin	ID	Custer	Little Antelope Flat	FS	2195	12N	21E	5,8		11	4919800	738700
16	8/10/96	Texas Cr.	1715	1740	J. Yeo	ID	Lemhi	Gilmore	BLM	2073	13N	27E	5		12	4927900	320500
17	8/11/96	Eighteenmile Cr.	1400	1430	J. Yeo	ID	Lemhi	Cottonwood Creek	BLM	2512	13N	29E	7		12	4925850	337750
18	8/11/96	Eighteenmile Cr.	1545	1615	J. Yeo	ID	Lemhi	Cottonwood Creek	BLM	2390	13N	28E	1		12	4927250	335300
19	8/11/96	Salmon landfill pond	1900	1930	J. Yeo	ID	Lemhi	Sal Mountain	BLM	1280	21N	22E	28	nwsenw	12	5000500	274700
20	8/11/96	Hot Springs Cr.	1830	1850	J. Yeo	ID	Lemhi	Sal Mountain	BLM	1256	21N	22E	28	nesw	12	5000000	274400
21	8/13/96	Spring Hill pond #6	1345	1400	C. Bolin	ID	Custer	Spring Hill	BLM	2182	11N	23E	10	nesesw	12	4907900	282800
22	8/13/96	Spring Hill pond #5			C. Bolin	ID	Custer	Spring Hill	BLM	2207	11N	23E	10	seswsw	12	4907700	282500
23	8/13/96	Spring Hill pond #4			C. Bolin	ID	Custer	Spring Hill	BLM	2225	11N	23E	10	swswsw	12	4907800	282300
24	7/24/97	Spring Hill pond #3	1215	1240	J. Yeo	ID	Custer	Spring Hill	BLM	2182	11N	23E	15		12	4907337	282790
25	7/24/97	Spring Hill pond #2	1320	1400	J. Yeo	ID	Custer	Spring Hill	BLM	2237	11N	23E	15		12	4907367	282173
26	7/24/97	Spring Hill pond #1	1430	1450	J. Yeo	ID	Custer	Spring Hill	BLM	2128	11N	23E	15		12	4907289	283428
27	8/14/96	Carlson Lake			C. Bolin	ID	Custer	Doublespring	BLM	2487	11N	23E	17	nese	12	4906600	280400
28	8/14/96	upper Road Cr. exclosure	1300	1320	J. Yeo	ID	Custer	Horse Basin	BLM	2231	10N	20E	34,35		11	4893200	734300
29	8/14/96	upper Road Cr. pond	1115	1130	J. Yeo	ID	Custer	Horse Basin	BLM	2377	10N	21E	31	senwnw	11	4893450	737750
30	8/14/96	upper Road Cr. exclosure	1325	1350	J. Yeo	ID	Custer	Horse Basin	BLM	2316	10N	20E	34	swse	11	4892150	733700
31	8/5/97	Mud Lake	1200	1238	J. Yeo	ID	Butte	Methodist Creek	FS	2268	8N	25E	36		12	4872800	305900
32	8/17/96	Twin Lakes			C. Bolin	ID	Butte	Methodist Creek	FS	2190	7N	25E	1		12	4871000	305000
33	7/4/96	Doublesprings	1045	1115	J. Yeo	ID	Custer	Doublespring	FS	2094	12N	23E	31	seswsw	12	4911000	277700
34	7/4/96	Mud Spring exclosure	1430	1500	J. Yeo	ID	Custer	Burnt Creek	FS	2353	10N	23E	9	sesene	12	4898900	281500
35	7/4/96	Burnt Cr. - spring	1830	1845	J. Yeo	ID	Custer	Burnt Creek	BLM	2438	10N	24E	32	nesese	12	4891700	289400
36	7/4/96	Burnt Cr. - spring	1900	1915	J. Yeo	ID	Custer	Burnt Creek	FS	2524	9N	24E	5	nenenw	12	4891350	288600
37	7/5/96	Burnt Cr. Lake	900	945	J. Yeo	ID	Custer	Burnt Creek	BLM	2499	9N	24E	4	neswnw	12	4890850	289800
38	7/5/96	Burnt Cr. exclosure	1100	1215	J. Yeo	ID	Custer	Burnt Creek	BLM	2304	10N	24E	20	nw	12	4895700	288400
39	7/5/96	Summit Cr.	1400	1530	J. Yeo	ID	Custer	Moffet Springs	BLM	1951	11N	25E	22,23		12	4905200	304000
40	7/5/96	Summit Resevoir Dam	1530	1545	J. Yeo	ID	Custer	Donkey Creek	BLM	2012	11N	25E	5	sesw	12	4908700	300000
41	7/9/96	South Butte Mine pond	1015	1055	J. Yeo	ID	Custer	Clayton	BLM	2134	11N	17E	15	swsenw	11	4906400	703750
42	7/9/96	South Butte Mine pond	1145	1205	J. Yeo	ID	Custer	Clayton	BLM	2158	11N	17E	15	nwnwne	11	4906900	704100
43	7/9/96	South Butte Mine pond	1215	1215	J. Yeo	ID	Custer	Clayton	BLM	2170	11N	17E	15	nenwne	11	4907000	704200

Appendix II. Summary of survey site localities.

Site No.	Date	Locality	Begin Time	End Time	Observer	State	County	Map Name	Owner	Elevation (m)	Twnshp	Range	Section	Aliquot	UTM Zone	Northing (m)	Easting (m)
44	7/9/96	South Butte Mine pond	1305	1320	J. Yeo	ID	Custer	Clayton	BLM	2158	11N	17E	10	swseesw	11	4907100	703700
45	7/16/96	Grouse Cr. Lake	1600	1645	J. Yeo	ID	Custer	Meadow Peak	FS	2560	12N	21E	3		12	4920400	284200
46	7/16/96	Crane Basin exclosure	1430	1450	J. Yeo	ID	Custer	Little Antelope Flat	FS	2329	12N	21E	5	nwseenw	12	4920600	738600
47	7/16/96	Wino Basin	1730	1750	J. Yeo	ID	Custer	Meadow Peak	FS	2609	12N	21E	3		12	4921400	283100
48	7/19/96	Horse Basin Spring No. 1	930	950	J. Yeo	ID	Custer	Horse Basin	BLM	2310	10N	20E	23	nenwsw	11	4896000	734400
49	5/30/97	Horse Basin pond	1215	1233	J. Yeo	ID	Custer	Horse Basin	BLM	2341	10N	20E	23	sesw	11	4895484	734981
50	7/20/96	Birch Cr. Springs	1245	1400	J. Yeo	ID	Lemhi	Blue Dome	BLM	1951	11N	29E	35	w	12	4900000	342000
51	7/20/96	Yearian pond	1745	1815	J. Yeo	ID	Lemhi	Agency Creek	BLM	1939	18N	24E	13	nesese	12	4973200	298800
52	7/20/96	Yearian pond	1830	1915	J. Yeo	ID	Lemhi	Agency Creek	BLM	1926	18N	24E	13	swse	12	4973100	298300
53	7/22/96	Hyde Cr. pond	1340	1440	J. Yeo	ID	Lemhi	Williams Lake	BLM	1317	20N	22E	5	nwswne	12	4997200	273300
54	7/25/96	Upper Cedar Cr.	1030	1100	J. Yeo	ID	Custer	Leatherman Peak	FS	2195	8N	24E	19	sw	12	4876000	286700
55	8/21/96	Tower Cr. Slough	1500	1730	J. Yeo	ID	Lemhi	Bird Creek	BLM	1146	23N	21,22E	12,13,7,1 8		12	5023400	272200
56	5/13/97	Warm Springs Cr. - mouth	1610	1715	J. Yeo	ID	Lemhi	Williams Lake	BLM	1228	21N	22E	29		12	5000100	273807
57	5/14/97	Tower Slough pond	1324	1400	J. Yeo	ID	Lemhi	Bird Creek	BLM	1158	23N	22E	18	nwnw	12	5023398	272134
58	7/13/97	Chilly Slough - south end	1222	1511	J. Yeo	ID	Custer	Elkhorn Creek	BLM	1914	9N	22E	27	w	12	4884876	271979
59	7/15/97	Birch Cr. CA	1500	1530	J. Yeo	ID	Lemhi	Italian Canyon	BLM	1987	11N	29E	27	neswnw	12	4902293	341061
60	7/15/97	Birch Cr. CA	1350	1450	J. Yeo	ID	Lemhi	Italian Canyon	BLM	2024	11N	29E	21	senese	12	4903344	340802
61	7/15/97	Birch Cr. CA	1600	1700	J. Yeo	ID	Lemhi	Italian Canyon	BLM	1963	11N	29E	27	sesenw	12	4902021	341583
62	7/16/97	Cow Cr. pond	925	1010	J. Yeo	ID	Lemhi	Agency Creek	BLM	1951	18N	24E	12	neswne	12	4975661	298449
63	7/23/97	Grouse Cr. pond	1215	1245	J. Yeo	ID	Custer	Meadow Peak	FS	2304	12N	21E	11		12	4919303	285947
64	8/5/97	Bear Cr.	1345	1405	J. Yeo	ID	Custer	Methodist Creek	FS	2146	8N	25E	34		12	4873275	302151
65	8/22/97	Bear Cr. pond	1230	1245	J. Yeo	ID	Custer	Jerry Peak	BLM	2316	9N	20E	8		11	4889451	730647
66	8/22/97	Bear Cr. pond	1300	1330	J. Yeo	ID	Custer	Jerry Peak	BLM	2304	9N	20E	8		11	4889482	730497
67	9/5/97	Merriam Lake	1245	1315	J. Yeo	ID	Custer	Elkhorn Creek	FS	2926	9N	23E	17		12	4887776	279610
68	9/15/97	Trail Cr. ACEC	1230	1315	J. Yeo	ID	Lemhi	Lem Peak	BLM	2402	18N	22E	27		12	4970400	275500
69	7/24/97	Spring Hill pond	1100	1115	J. Yeo	ID	Custer	Spring Hill	BLM	2134	11N	23E	15		12	4907128	283396
70	7/24/97	Spring Hill pond	1130	1150	J. Yeo	ID	Custer	Spring Hill	BLM	2134	11N	23E	15		12	4907159	283211

Appendix III. Summary of physical and chemical data for survey sites.

Site No.	Year	Date	Locality	Weather	Wind	Air Temp. (C)	Water Temp. (C)	pH	Conductivity (μS/cm)	Color	Turbidity
1	1996	16-May	Freighter Spring Exclosure	overcast	calm			7.6	20	clear	clear
2	1996	16-May	McGowan Cr. stock pond	rain	strong	10		8.2	29	clear	clear
3	1996	16-May	Antelope Flat carex bog	rain	strong	10				clear	cloudy
4	1996	17-May	Alkali Spring exclosure	pt. cloudy	light	16		7.5	69	clear	clear
5	1996	17-May	Ryegrass Spring exclosure	pt. cloudy	light	18				clear	clear
6	1996	22-May	Lake Cr. beaver pond	pt. cloudy	strong	9	4	7.8	16	clear	clear
7	1996	22-May	Herd Lake, south shore	pt. cloudy	strong	9	10	8.4	8	clear	clear
8	1996	5-Jun	Bear Cr. Pond	clear	calm		dry				
9	1996	5-Jun	Horse Basin/Corral Basin exclosure	clear	light	19	16		23	clear	clear
10	1996	5-Jun	lower Road Cr.	clear	light	19	16		23	clear	clear
11	1996	5-Jun	White Colt Spring	clear	light	19				clear	clear
12	1996	6-Jun	Little Morgan Cr.	clear	calm					clear	cloudy
13	1996	7-Jun	Thousand Springs	clear	light	18	16	8.4	17	clear	clear
14	1996	7-Jun	Whiskey Springs	clear	calm	32				clear	clear
15	1996	8-Jun	Crane Basin	clear	calm						
16	1996	10-Jun	Texas Cr.	clear	calm	25	25		22	stained	cloudy
17	1996	11-Jun	Eighteenmile Cr.	clear	calm	11	9		6	clear	clear
18	1996	11-Jun	Eighteenmile Cr.	clear	light	11	15		4	clear	cloudy
19	1996	11-Jun	Salmon landfill pond	clear	calm	21				stained	cloudy
20	1996	11-Jun	Hot Springs Cr.	clear	calm	21				clear	clear
21	1996	13-Jun	Spring Hill pond #6	pt. cloudy	calm	22	24		7	stained	cloudy
22	1996	13-Jun	Spring Hill pond #5	pt. cloudy	calm	21	15		31	clear	clear
23	1996	13-Jun	Spring Hill pond #4	pt. cloudy	calm	21	20		29	clear	clear
24	1997	24-Jul	Spring Hill pond #3	pt. cloudy	light	26	22	9.7	17	clear	cloudy
25	1997	24-Jul	Spring Hill pond #2	pt. cloudy	light	26	19	9.3	20	clear	clear
26	1997	24-Jul	Spring Hill pond #1	pt. cloudy	light	26	22	8.8	24	clear	clear
27	1996	14-Jun	Carlson Lake				16		15	clear	clear
28	1996	14-Jun	upper Road Cr. exclosure	pt. cloudy	light					clear	clear
29	1996	14-Jun	upper Road Cr. pond	pt. cloudy	calm	26				clear	clear
30	1996	14-Jun	upper Road Cr. exclosure	pt. cloudy	light					clear	clear
31	1997	5-Aug	Mud Lake	overcast	light	15	18	9.5	100	stained	cloudy
32	1996	17-Jun	Twin Lakes	pt. cloudy	strong		19		51	clear	clear
33	1996	4-Jul	Doublesprings	pt. cloudy	light	23	5		100	clear	clear
34	1996	4-Jul	Mud Spring exclosure	pt. cloudy	light					clear	clear

Appendix III. Summary of physical and chemical data for survey sites.

Site No.	Year	Date	Locality	Weather	Wind	Air Temp. (C)	Water Temp. (C)	pH	Conductivity (μS/cm)	Color	Turbidity
35	1996	4-Jul	Burnt Cr. - spring	clear	calm					clear	clear
36	1996	4-Jul	Burnt Cr. - spring	clear	calm					clear	clear
37	1996	5-Jul	Burnt Cr. Lake	clear	light	15	15		170	clear	clear
38	1996	5-Jul	Burnt Cr. exclosure	pt. cloudy	light	16	17		230	clear	clear
39	1996	5-Jul	Summit Cr.	pt. cloudy	strong	25	22		210	clear	clear
40	1996	5-Jul	Summit Resevoir Dam	pt. cloudy	strong					stained	cloudy
41	1996	9-Jul	South Butte Mine pond	pt. cloudy	calm	18	20		40	stained	clear
42	1996	9-Jul	South Butte Mine pond	pt. cloudy	calm	16	21		130	stained	clear
43	1996	9-Jul	South Butte Mine pond	pt. cloudy	calm	16	dry				
44	1996	9-Jul	South Butte Mine pond	pt. cloudy	strong	19	22		80	stained	clear
45	1996	16-Jul	Grouse Cr. Lake	pt. cloudy	strong	18	21		230	clear	clear
46	1996	16-Jul	Crane Basin exclosure	pt. cloudy	strong	18				clear	clear
47	1996	16-Jul	Wino Basin	pt. cloudy	strong	18					
48	1996	19-Jul	Horse Basin Spring No. 1	clear	calm	26				clear	clear
49	1997	30-May	Horse Basin pond	pt. cloudy	calm	19	19	8.6	1	stained	clear
50	1996	20-Jul	Birch Cr. Springs	clear	calm	11	9		200	clear	clear
51	1996	20-Jul	Yearian pond	pt. cloudy	strong	21				stained	clear
52	1996	20-Jul	Yearian pond	pt. cloudy	strong	21	21		240	clear	cloudy
53	1996	22-Jul	Hyde Cr. pond	clear	light	24	21		230	stained	cloudy
54	1996	25-Jul	Upper Cedar Cr.								
55	1996	21-Aug	Tower Cr. Slough	clear	calm					clear	clear
56	1997	13-May	Warm Springs Cr. - mouth	pt. cloudy	light	26	29		110	stained	cloudy
57	1997	14-May	Tower Slough pond	clear	light	26	25		280	clear	clear
58	1997	13-Jul	Chilly Slough - south end	clear	calm	25	21	9.3	35	clear	clear
59	1997	15-Jul	Birch Cr. CA	pt. cloudy	strong	28	23	7.6	36	clear	clear
60	1997	15-Jul	Birch Cr. CA	pt. cloudy	light	28	16	8.2	21	stained	clear
61	1997	15-Jul	Birch Cr. CA	pt. cloudy	strong	25	24	8.6	21	clear	clear
62	1997	16-Jul	Cow Cr. pond	clear	light	23	19	7.2	25	stained	clear
63	1997	23-Jul	Grouse Cr. pond	pt. cloudy	light	26	8	8.4	12	clear	clear
64	1997	5-Aug	Bear Cr.	overcast	calm	14	8	8.6	19	clear	clear
65	1997	22-Aug	Bear Cr. pond	pt. cloudy	calm	25	19	8.4	7	stained	clear
66	1997	22-Aug	Bear Cr. pond	pt. cloudy	light	25	21	9.1	5	stained	clear
67	1997	5-Sep	Merriam Lake	pt. cloudy	light	13	11	8.7	12	clear	clear
68	1997	15-Sep	Trail Cr. ACEC	pt. cloudy	light	7	4	8.6	0.5	clear	clear

Appendix III. Summary of physical and chemical data for survey sites.

Site No.	Year	Date	Locality	Weather	Wind	Air Temp. (C)	Water Temp. (C)	pH	Conductivity (u S/cm)	Color	Turbidity
69	1997	24-Jul	Spring Hill pond	clear	light	26	21	8.7	19	clear	clear
70	1997	24-Jul	Spring Hill pond	clear	calm	26	18	8.9	16	stained	clear

Appendix IV. Summary of amphibian and reptile species detected at survey sites.

Site No.	Year	Date	Locality	Species	No. Adults	No. Juveniles	No. Metamorphs	No. Larvae	No. Egg Masses	Technique	Fish Present	Fish Species
1	1996	16-May	Freighter Spring Exclosure							visual search, dipnetting	no	
1	1996	25-Jul	Freighter Spring Exclosure							visual search, dipnetting	no	
2	1996	16-May	McGowan Cr. stock pond							visual search, dipnetting	yes	??
2	1996	16-Jul	McGowan Cr. stock pond							visual search, dipnetting	yes	??
2	1996	25-Jul	McGowan Cr. stock pond							visual search, dipnetting	yes	??
3	1996	16-May	Antelope Flat carex bog							visual search, dipnetting	no	
4	1996	17-May	Alkali Spring exclosure							visual search, dipnetting	no	
5	1996	17-May	Ryegrass Spring exclosure							visual search, dipnetting	no	
5	1996	5-Jun	Ryegrass Spring exclosure							visual search, dipnetting	no	
6	1996	22-May	Lake Cr. beaver pond							visual search, dipnetting	yes	??
7	1996	22-May	Herd Lake, south shore							visual search, dipnetting	yes	??
8	1996	5-Jun	Bear Cr. Pond							visual search, dipnetting	no	
9	1996	5-Jun	Horse Basin/Corral Basin exclosure							visual search, dipnetting	no	
10	1996	5-Jun	lower Road Cr.							visual search, dipnetting	yes	??
11	1996	5-Jun	White Colt Spring							visual search, dipnetting	no	
12	1996	6-Jun	Little Morgan Cr.							visual search, dipnetting	??	
13	1996	7-Jun	Thousand Springs	Columbia Spotted Frog	6					visual search, dipnetting	no	
14	1996	7-Jun	Whiskey Springs	Columbia Spotted Frog	1					visual search, dipnetting	??	
15	1996	8-Jun	Crane Basin							visual search, dipnetting	no	
16	1996	10-Jun	Texas Cr.	Columbia Spotted Frog	1					visual search, dipnetting	no	
17	1996	11-Jun	Eighteenmile Cr.	Columbia Spotted Frog	2					visual search, dipnetting	no	
18	1996	11-Jun	Eighteenmile Cr.	Long-toed Salamander				100+		visual search, dipnetting	no	
18	1996	11-Jun	Eighteenmile Cr.	Columbia Spotted Frog	2					visual search, dipnetting	no	
19	1996	11-Jun	Salmon landfill pond							visual search, dipnetting	no	
20	1996	11-Jun	Hot Springs Cr.							visual search, dipnetting, automated recording	no	
20	1996	23-Jul	Hot Springs Cr.							visual search, dipnetting, automated recording	no	
21	1996	13-Jun	Spring Hill pond #6							visual search, dipnetting	no	
22	1996	13-Jun	Spring Hill pond #5							visual search, dipnetting	no	
23	1996	13-Jun	Spring Hill pond #4							visual search, dipnetting	no	
24	1996	13-Jun	Spring Hill pond #3							visual search, dipnetting	no	
24	1997	24-Jul	Spring Hill pond #3							visual search, dipnetting	no	
25	1996	13-Jun	Spring Hill pond #2							visual search, dipnetting	no	
25	1997	24-Jul	Spring Hill pond #2							visual search, dipnetting	no	
26	1996	13-Jun	Spring Hill pond #1							visual search, dipnetting	no	
26	1997	24-Jul	Spring Hill pond #1	W. T. Garter Snake	2					visual search, dipnetting	no	
27	1996	14-Jun	Carlson Lake							visual search, dipnetting	yes	cutthroat trout
28	1996	14-Jun	upper Road Cr. exclosure							visual search, dipnetting	yes	??
29	1996	14-Jun	upper Road Cr. pond							visual search, dipnetting	no	
30	1996	14-Jun	upper Road Cr. exclosure							visual search, dipnetting	no	
31	1996	17-Jun	Mud Lake							visual search dipnetting	no	
31	1997	5-Aug	Mud Lake							visual search, dipnetting	no	
32	1996	17-Jun	Twin Lakes							visual search, dipnetting	??	
33	1996	4-Jul	Doublesprings							visual search, dipnetting	no	
33	1996	16-Aug	Doublesprings							visual search, dipnetting	no	
34	1996	4-Jul	Mud Spring exclosure							visual search, dipnetting	no	

Appendix IV. Summary of amphibian and reptile species detected at survey sites.

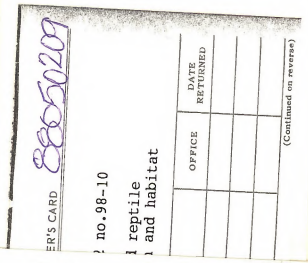
Site No.	Year	Date	Locality	Species	No. Adults	No. Juveniles	No. Metamorphs	No. Larvae	No. Egg Masses	Technique	Fish Present	Fish Species
35	1996	4-Jul	Burnt Cr. - spring							visual search	no	
36	1996	4-Jul	Burnt Cr. - spring							visual search	no	
37	1996	5-Jul	Burnt Cr. Lake							visual search, dipnetting	no	
38	1996	5-Jul	Burnt Cr. exclosure							visual search, dipnetting	??	
39	1996	5-Jul	Summit Cr.	Unknown Garter Snake						visual search, dipnetting	yes	brook trout
40	1996	5-Jul	Summit Reservoir Dam							visual search, dipnetting	??	
41	1996	9-Jul	South Butte Mine pond	Long-toed Salamander				100's		visual search, dipnetting	no	
42	1996	9-Jul	South Butte Mine pond	Long-toed Salamander				100's		visual search, dipnetting	no	
43	1996	9-Jul	South Butte Mine pond							visual search		
44	1996	9-Jul	South Butte Mine pond							visual search, dipnetting	no	
45	1996	16-Jul	Grouse Cr. Lake							visual search, dipnetting	no	
46	1996	16-Jul	Crane Basin exclosure							visual search	no	
47	1996	16-Jul	Wino Basin							visual search, dipnetting	no	
48	1996	19-Jul	Horse Basin Spring No. 1							visual search	no	
49	1996	19-Jul	Horse Basin pond							visual search, dipnetting	no	
49	1997	30-May	Horse Basin pond							visual search, dipnetting	no	
50	1996	20-Jul	Birch Cr. Springs							visual search, dipnetting	yes	brook trout
51	1996	20-Jul	Yearian pond							visual search, dipnetting	no	
52	1996	20-Jul	Yearian pond	Columbia Spotted Frog	2					visual search, dipnetting	??	
53	1996	22-Jul	Hyde Cr. pond	Columbia Spotted Frog	4					visual search, dipnetting	yes	??
54	1996	25-Jul	Upper Cedar Cr.							visual search, dipnetting	??	
55	1996	21-Aug	Tower Cr. Slough	W. T. Garter Snake	1					visual search, dipnetting	yes	??
56	1997	13-May	Warm Springs Cr. - mouth	Pacific Treefrog				4		visual search, dipnetting	no	
57	1997	14-May	Tower Slough pond	Columbia Spotted Frog				10+		visual search, dipnetting	??	
57	1997	14-May	Tower Slough pond	Painted Turtle	3					visual search, dipnetting	??	
58	1997	13-Jul	Chilly Slough - south end	Columbia Spotted Frog	3+			100's		visual search	yes	brook, rainbow?
59	1997	15-Jul	Birch Cr. CA	W. T. Garter Snake		1				visual search	yes	brook trout
59	1997	15-Jul	Birch Cr. CA	Columbia Spotted Frog	3	2				visual search	yes	brook trout
60	1997	15-Jul	Birch Cr. CA	W. T. Garter Snake		1				visual search	no	
60	1997	15-Jul	Birch Cr. CA	Columbia Spotted Frog	1					visual search	no	
61	1997	15-Jul	Birch Cr. CA	Columbia Spotted Frog				20+		visual search, dipnetting	no	
62	1997	16-Jul	Cow Cr. pond	W. T. Garter Snake	5					visual search, dipnetting	no	
62	1997	16-Jul	Cow Cr. pond	Columbia Spotted Frog	12			1		visual search, dipnetting	no	
63	1997	23-Jul	Grouse Cr. pond							visual search, dipnetting	no	
64	1997	5-Aug	Bear Cr.							visual search, dipnetting	??	
65	1997	22-Aug	Bear Cr. pond							visual search, dipnetting	no	
66	1997	22-Aug	Bear Cr. pond	W. T. Garter Snake	3	3				visual search, dipnetting	no	
66	1997	22-Aug	Bear Cr. pond	Western Toad			3			visual search, dipnetting	no	
66	1997	22-Aug	Bear Cr. pond	Columbia Spotted Frog				20+		visual search, dipnetting	no	
67	1997	5-Sep	Merriam Lake							visual search, dipnetting	yes	
68	1997	15-Sep	Trail Cr. ACEC							visual search, dipnetting	no	
69	1997	24-Jul	Spring Hill pond							visual search, dipnetting	no	
70	1997	24-Jul	Spring Hill pond							visual search, dipnetting	no	

Appendix V. Summary of habitat characteristics of survey sites.

Site No.	Year	Date	Locality	Origin	Drainage	Description	Primary Substrate	Site Length (m)	Site Width (m)	Max. Depth (m)	Emergent Vegetation	% Shoreline w/ Emergent Vegetation	Stream Order	Distance to Forest Edge (m)	Riparian Vegetation	Comments
1	1996	16-May	Freighter Spring Enclosure	natural	perma nent	spring/seep	silt/mud	150	100	< 1	sedge, rush			> 1000	willow, sedge, rush	exclosure
2	1996	16-May	McClure Cr. stock pond	man-made	perma nent	permanent pond	silt/mud	20	15	< 1	rush, sedge	25-50		> 1000		previously grazed
3	1996	16-May	Antelope Flat cerex bog	man-made	occasional	temporary pond	silt/loud	100	40	< 1	sedge			> 1000		previously grazed
4	1996	17-May	Alkali Sp ing exclosure	natural	perma nent	spring/seep	sand/gravel	1000	20	< 1				> 1000	sedge, rush, birch, grasswood	exclosure
5	1996	17-May	Ryegrass Spring exclosure	man-made	occasional	spring/seep	sand/gravel	75	10	< 1				> 1000	sagebrush, saltgrass, sedge	exclosure
6	1996	22-May	Lake Cr beaver pond	natural	perma nent	inactive beaver pond	silt/mud	30	20	< 1	sedge		1	> 1000	sedge, willow	
7	1996	22-May	Herd Lake, south shore	natural	perma nent	permanent lake	silt/mud	50	5	1-2	sedge	> 50		> 1000	sedge	
8	1996	5-Jun	Bear Cr. Pond	natural	perma nent	inactive beaver pond	silt/mud	10	6	< 1	sedge		1	>1000	sedge, willow	dry
9	1996	5-Jun	Horse Basin/Corral Basin exclosure	natural	perma nent	stream	sand/gravel	2,000	20	< 1			3	> 1000	sagebrush, sedge, grasswood	exclosure
10	1996	5-Jun	Sawer Road Cr.	natural	perma nent	active beaver pond	silt/mud	1000	30	1-2	sedge			> 1000	sedge, willow, birch	
11	1996	5-Jun	White Colt Spring	man-made	occasional	spring/seep	sand/gravel	25	1	< 1				> 1000	sagebrush, gooseberry, willow	
12	1996	8-Jun	Little Morgan Cr.	natural	perma nent	stream	sand/gravel	100	20	< 1					cottonwood, willow, birch	
13	1996	7-Jun	Thousand Springs	natural	perma nent	spring/seep	silt/mud	1000	700	1-2				> 1000	sedge, grass	
14	1996	7-Jun	Whiskey Springs	natural	perma nent	marsh/bog	silt/mud	200	50	< 1	sedge, cattails, rush	> 50		> 1000	sedge	
15	1996	9-Jun	Crane Basin	natural		spring/seep								> 1000	???	
16	1996	10-Jun	Texas Cr	man-made	perma nent	stream	cobble	100	4	< 1	sedge		1	> 1000	sedge	
17	1996	11-Jun	Eighteen mile Cr.	natural	perma nent	spring/seep	silt/mud	50	25	< 1	sedge			??	sedge, willow	
18	1996	11-Jun	Eighteen mile Cr.	natural	perma nent	pond	silt/mud	20	15	1-2	willow, sedge	> 50		> 1000	willow, sedge	
19	1996	11-Jun	Salmon landfill pond	man-made	occasional	pond	silt/mud	75	50	1-2	sedge, rush	1-25		> 1000		
20	1996	11-Jun	Hot Springs Cr.	natural	perma nent	stream	silt/mud	100	3	< 1	rush, cattails			> 1000	rush, cattails	
21	1996	13-Jun	Spring Hill pond #6	natural	none	pond	silt/mud	30	15	< 1	sedge	> 50		> 1000	sedge	
22	1996	13-Jun	Spring Hill pond #5	natural	occasional	pond	silt/mud			< 1				> 1000		
23	1996	13-Jun	Spring Hill pond #4	natural	occasional	pond	silt/mud			< 1				> 1000		
24	1997	24-Jul	Spring Hill pond #3	natural	none	pond	silt/mud	100	20	1-2	sedge, bull rush, horsetail	1-25		500	sedge	cattle trampling on shore
25	1997	24-Jul	Spring Hill pond #2	natural	perma nent	pond	silt/mud	75	50	1-2	sedge	> 50		500	sedge	
26	1997	24-Jul	Spring Hill pond #1	natural	perma nent	pond	silt/mud	15	10	< 1	sedge	> 50		> 1000	sedge, willow, aspen	
27	1996	14-Jun	Carlson Lake	natural	perma nent	lake										
28	1996	14-Jun	upper Rcad Cr. exclosure	natural	perma nent	st eam/bog	silt/mud	30	15	< 1	sedge				willow, sedge	
29	1996	14-Jun	upper Road Cr. pond	man-made	occasional	pond	silt/mud	25	25	1-2	grass, sedge, rush	> 50		500	same	intact exclosure
30	1996	14-Jun	upper Rcad Cr. exclosure	natural	perma nent	st eam/bog	silt/mud	30	15	< 1	sedge				willow, cottonwood, sedge	
31	1997	5-Aug	Mud Lake	natural	none	lake	silt/mud	100	60	> 2	horsetail	> 50		600	none	breached exclosure, trampled
32	1996	17-Jun	Twin Lakes	natural						1-2						
33	1996	4-Jul	Doublesprings	natural	perma nent	spring/seep	silt/mud	125	2	< 1	grass, sedge				grass, sedge	exclosure
34	1996	4-Jul	Mud Spring exclosure	natural	perma nent	spring/seep	silt/mud	75	30	< 1	grass, sedge					
35	1996	4-Jul	Burnt Cr. - spring	natural	perma nent	spring/seep	silt/mud	10	10	< 1					sedge, willow	livestock trampled
36	1996	4-Jul	Burnt Cr. - spring	natural	perma nent	spring/seep	silt/mud	10	10	< 1					sedge, willow	livestock trampled
37	1996	4-Jul	Burnt Cr. Lake	natural	occasional	lake	silt/mud	100	50	1-2	bulrushes	1-25		1	sedge	no fish
38	1996	5-Jul	Burnt Cr. exclosure	natural	perma nent	active beaver pond	silt/mud	500	50	1-2	sedge,willow	25-50	1	> 1000	willow, sedge	exclosure
39	1996	5-Jul	Summit Cr	natural	perma nent	stream	sand/gravel	1000	25	< 1	sedge	> 50	1		willow, birch, sedge	brook trout abundant
40	1996	5-Jul	Summit Reservoir Dam	man-made	perma nent	lake	cobble	100	5	1-2		0			none	extensive livestock use
41	1996	9-Jul	South Butte Mine pond	natural	none	pond	silt/mud	70	60	< 1	sedge	> 50		500	sedge	temporary pond
42	1996	9-Jul	South Butte Mine pond	natural	occasional	pond	silt/mud	100	30	< 1	sedge	> 50		300	sedge	temporary pond
43	1996	9-Jul	South Butte Mine pond	natural	none	pond										dry
44	1996	9-Jul	South Butte Mine pond	natural	none	pond	silt/mud	30	25	1-2	sedge	25-50		> 500	willow, aspen, sedge	
45	1996	16-Jul	Grouse Cr. Lake	natural	none	lake	silt/mud	150	75	1-2	bulrushes, sedge	> 50		50	sedge	breached exclosure, trampled
46	1996	16-Jul	Cross Basin exclosure	natural	occasional	spring/seep	silt/mud	50	1	< 1	sedge				willow, sedge	
47	1996	16-Jul	Wino Basin	natural	none	pond	silt/mud	50	50	< 1	sedge, rush	> 50				
48	1996	19-Jul	Horse Basin Spring No. 1	natural	perma nent	spring/seep	silt/mud	50	10	< 1				> 1000	willow, sedge	
49	1996	19-Jul	Horse Basin pond	natural	none	pond	silt/mud	15	15	< 1	sedge	> 50		> 1000	sedge	
50	1997	30-May	Horse Basin pond	natural	occasional	pond	silt/mud	40	25	< 1	sedge	> 50		> 1000	sedge	
51	1996	20-Jul	Birch Cr. Springs	natural	perma nent	stream	sand/gravel	400	25	< 1	monkeyflower, sedge		1	> 1000	sedge	brook trout common
52	1996	20-Jul	Yeerian pond	natural	none	pond	silt/mud	100	75	< 1	rush	> 50		500	grass, sedge	
53	1996	20-Jul	Yeerian pond	man-made	occasional	lake	silt/mud	250	100	> 2	rush, willow	1-25		150	sedge, grass, willow	
54	1996	22-Jul	Hyde Cr. pond	man-made	perma nent	pond	silt/mud	50	50	> 2	cattail	> 50		> 1000	grass, sedge	fish present
	1996	25-Jul	Upper Cedar Cr	natural	perma nent	stream	boulder/bedrock	100	4	< 1			2	0	Douglas-fir, cottonwood, willow, rose	entire stream diverted at canyon mouth

Appendix V. Summary of habitat characteristics of survey sites.

Site No.	Year	Date	Locality	Origin	Drainage	Description	Primary Substrate	Site Length (m)	Site Width (m)	Max. Depth (m)	Emergent Vegetation	% Shoreline w/ Emergent Vegetation	Stream Order	Distance to Forest Edge (m)	Riparian Vegetation	Comments
55	1996	21-Aug	Tower Cr. Slough	natural	occasional	marsh/bog	silt/mud	1000	40	1-2					cottonwood, willow, birch	
56	1997	13-May	Warm Springs Cr. - mouth	natural	none	pond	silt/mud	30	15	< 1	rush	> 50		> 1000	grasses/sedge	temporary pond
57	1997	14-May	Tower Slough pond	natural	none	pond	silt/mud	50	50	1-2	cattail	1-25		10	cottonwood	osprey nest box
58	1997	13-Jul	Chilly Slough - south end	natural	perma'nent	marsh/bog	silt/mud	1000	500	1-2	cattail, bulrush	> 50		> 1000	sedge	
59	1997	15-Jul	Birch Cr. CA	natural	perma'nent	stream	sand/gravel	300	2	< 1			1	> 1000	sedge	
60	1997	15-Jul	Birch Cr. CA	natural	perma'nent	bog	silt/mud	100	50	< 1	sedge			> 1000	sedge	
61	1997	15-Jul	Birch Cr. CA	natural	perma'nent	stream	sand/gravel	100	2	< 1	sedge		1	> 1000	sedge	fish present
62	1997	16-Jul	Cow Cr. pond	natural	occasional	pond	silt/mud	25	12	1-2	sedge, cattail	> 50		25	sedge, grass, aspen	
63	1997	23-Jul	Grouse Cr. pond	man-made	perma'nent	pond	silt/mud	100	40	> 2		0		10		
64	1997	5-Aug	Bear Cr.	natural	perma'nent	stream	cobble	100	2	< 1			2	30	aspen, willow, Douglas-fir	
65	1997	22-Aug	Bear Cr. pond	natural	none	pond	silt/mud	15	10	< 1	bottle rush?	> 50		100		
66	1997	22-Aug	Bear Cr. pond	natural	none	pond	silt/mud	50	20	< 1	bottle rush?	> 50		5		
67	1997	5-Sep	Merriam Lake	natural	perma'nent	lake	boulder/bedrock	200	100	> 2		0		1		
68	1997	15-Sep	Trail Cr. ACEC	natural	perma'nent	stream	boulder/bedrock	100	1	< 1			2	0	Douglas-fir, E spruce	
69	1997	24-Jul	Spring Hill pond	natural	none	pond	silt/mud	18	8	< 1	sedge	1-25		> 1000	sedge	livestock trampled
70	1997	24-Jul	Spring Hill pond	natural	perma'nent	pond	silt/mud	40	10	> 2	sedge	1-25		> 1000	willow, thistle, nettle, rose	



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